Chapter III: Affected Environment

Introduction

This chapter presents topics included in the analysis of the *South Fork Merced River Bridge Replacement Environmental Assessment* and provides a rationale for inclusion. Topics were selected based on federal law, regulations, and executive orders; *NPS Management Policies*; and concerns expressed by citizens, park staff, or other agencies during scoping and comment periods. Topics dismissed from further analysis and the rationale for dismissal are also provided herein.

Impact Topics Considered in this Assessment

Natural Resources

The federal Endangered Species Acts (and associated legislation), Clean Water Act, Clean Air Act, and the National Environmental Protection Act require that the effects of any federal undertaking on natural resources be examined. In addition, the *NPS Management Policies* and natural resource management guidelines require the consideration of natural resources in planning proposals. Important natural resources, including special- status species, are present near the Wawona developed area and could be affected by implementation of the alternatives.

Analysis was performed for the following natural resource topics:

- Geology, Geologic Hazards, and Soils
- Hydrology, Floodplains, and Water Quality
- Wetlands
- Biotic Communities (Vegetation, Wildlife, and Special- Status Species)
- Air Quality
- Soundscapes and Noise

Cultural Resources

The National Historic Preservation Act, Archeological Resources Protection Act, Native American Graves Protection and Repatriation Act, and National Environmental Protection Act require that the effects of any federal undertaking on cultural resources be examined. In addition, *NPS Management Policies* and cultural resource management guidelines require the consideration of cultural resources in planning proposals. Ethnographic resources are present in the form of mature plants subject to gathering by American Indian people. The South Fork Bridge is a historic resource located within the boundaries of both the Wawona Cultural Landscape and the Wawona Archeological District. However, the bridge is not eligible for inclusion in the National Register of Historic Places, nor is it a contributing element to the cultural landscape due to its compromised architectural integrity. The bridge was originally sided with massive log stringers and fitted with a wooden guardrail giving it the appearance of a rustic log structure. These elements, however, have been removed and the bridge has little left to distinguish it from other highway bridges.

Analysis was performed for the following cultural resource topics:

- Archeological Resources
- Ethnographic Resources
- Cultural Landscape Resources, including Historic Sites and Structures

Social Resources

Social resources analyses examine the effects of the South Fork Merced River Bridge Replacement Project on the social environment in the Wawona area. Scenic resources of the park represent a major component of the visitor experience. Conserving the scenery is an important component of the National Park Service 1916 Organic Act and the enabling legislation for the park. Yosemite National Park stewardship requires consideration of two integrated purposes: (1) to preserve Yosemite's unique natural and cultural resources and scenic beauty; and (2) to make these resources available to visitors for study, enjoyment, and recreation. Implementation of the South Fork Merced River Bridge Replacement Project has the potential to affect the type and quality of recreation in the immediate vicinity of the bridge near Wawona. The project could affect park operations and facilities such as the utility lines mounted on the bridge.

Analysis was performed for the following social resource topics:

- Socioeconomics
- Transportation
- Visitor Experience
- Scenic Resources
- Park Operations and Facilities

Impact Topics Dismissed from Further Analysis

Natural Resources

The following natural resource topics were dismissed from analysis:

- Lightscapes – In accordance with *NPS Management Policies*, the National Park Service strives to preserve natural ambient landscapes representing natural resources and values that exist in the absence of human- caused light. Lightscapes would not be affected by the bridge replacement and removal activities; therefore, this topic was dismissed from detailed analysis.
- Wilderness Values – Yosemite National Park adjoins designated wilderness on U.S. Forest Service lands (i.e., Ansel Adams Wilderness, Hoover Wilderness, and Emigrant Wilderness). The South Fork Merced River Bridge Replacement Project is in the Wawona developed area and is located well away from all areas designated as Wilderness. The Wild and Scenic River impact topic is being discussed under another section of this environmental assessment; therefore, wilderness values was dismissed from detailed analysis.

- Prime and Unique Farmlands – Prime or unique farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. Because there are no prime or unique farmlands associated with the project site, prime and unique farmlands were dismissed from detailed analysis.

Cultural Resources

The following cultural resource topic was dismissed:

- Indian Trust Resources – Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. There are no Indian trust resources in Yosemite National Park. Therefore, Indian trust resources was dismissed as an impact topic.

Social Resources

The following social resource topics were dismissed:

- Land Use – Land use in the project area would not be affected by the proposed project. This area is and would remain a vital part of the transportation corridor; therefore, this topic was dismissed from further analysis.
- Environmental Justice – Executive Order 12898 (*General Actions to Address Environmental Justice in Minority Populations and Low- Income Populations*) requires all agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low- income populations or communities. No alternative would have health or environmental effects on minorities or low- income populations or communities as defined in the U.S. Environmental Protection Agency Draft Environment Justice Guidance (USEPA 1996). Environmental Justice was, therefore, dismissed from detailed analysis.

Regional Setting

Yosemite National Park encompasses approximately 761,266 acres along the western slope of the Sierra Nevada range. This mountain range is the highest and most continuous in California, extending over 450 miles north- to- south and averaging approximately 100- miles wide. Elevations within the park range from approximately 2,000 to 13,114 feet.

The regional climate is temperate, with hot, dry summers and cold, wet winters. Approximately 85% of annual precipitation falls between November and April, either as rain at lower elevations or snow at higher elevations.

Two major river basins are located within the park, the Merced and the Tuolumne. The Merced River flows from the headwaters in the high elevations of the Sierra Nevada, through Yosemite Valley, and down to the San Joaquin Valley, where it contributes to the San Joaquin River. The

Merced River contains separate and unique watersheds, sustains separate hydrologic and aquatic resources, and supports differing levels of development. The main stem of the Merced River drains approximately 250,000 acres from the headwaters within the park to the Foresta Bridge in the El Portal area. The main stem of the Merced River flows a total of 140 miles from its headwaters to the confluence with the San Joaquin River. The South Fork drains the southern portion of the park, an area of approximately 76,000 acres. The Toulumne River drains the northern portion of the park, an area of approximately 435,000 acres. During 1987, the Wild and Scenic Rivers Act was amended to include 122 miles of both the main stem and the South Fork Merced River as Wild and Scenic (NPS 2001).

The South Fork Merced River originates at an elevation of 10,500 feet at the drainage divide with the Merced Peak Fork and flows westward, joining the Merced River 43 miles from its headwaters, west of El Portal, on land administered by the U.S. Forest Service (USGS 1992). Headwaters for the South Fork are in the vicinity of Triple Divide Peak where flows are westerly over granitic bedrock to Wawona.

The historic average annual flow of the South Fork Merced River, at its confluence with the Merced River, is 356- cfs, the minimum recorded flow was 2.2- cfs, and the maximum recorded flow was 46,500- cfs (USGS 1989). A 100- year flow volume of 13,563- cfs has been estimated through the South Fork Bridge cross- section (NPS 2000b). The average annual discharge of the South Fork Merced River is approximately 250,000 acre- feet (NPS 1978).

The major vegetation zones of the Sierra Nevada ecosystem form readily apparent, large- scale, north- south elevational bands along the axis of the mountain range. Major east- west watersheds that dissect the Sierra Nevada with steep canyons form a secondary pattern of vegetation. On the west side, forest types change with increasing elevation, from ponderosa pine to mixed conifer to firs. Straddling the crest of the Sierra Nevada is a zone of subalpine and alpine vegetation. Fire suppression, in concert with changing land- use practices, has dramatically changed natural fire regimes of the Sierra Nevada, altering ecological structures and functions in the Sierra Nevada plant communities (UC Davis 1996a,b,c,d).

Aquatic and riparian systems are the most altered and impaired habitats of the Sierra Nevada. Dams and diversions throughout most of the Sierra Nevada have altered streamflow patterns and water temperatures. Foothill areas below about 3,300 feet appear to have the greatest loss of riparian vegetation of any region in the Sierra Nevada (UC Davis 1996a,b,c,d).

Recreational opportunities abound in Yosemite National Park in developed and wilderness areas alike; however, the types and quality of activities vary considerably between these two areas. Recreational opportunities are made more memorable because of the natural beauty of Yosemite Valley, El Portal, and wilderness environments. These areas offer a wide range of recreational experiences for the visitor, including hiking, picnicking, camping, climbing, skiing, fishing, photography, swimming, nature study, livestock use, bicycling, sightseeing, and rafting. The availability of one or more of these opportunities varies by location.

The four basic categories of park operations are: resources management, facility management, visitor protection, and interpretive services. Park infrastructure and facilities include wilderness trails, roads, bridges and tunnels, campgrounds and lodging, and utilities. National Park Service management policies require that all facilities be managed, operated, and maintained to minimize energy consumption of nonrenewable fuels. The policies also require that new energy- efficient technologies be used where appropriate and cost effective.

Project Site Setting

The project site encompasses approximately 0.22 mile of the South Fork Merced River floodplain in Wawona. Wawona consists of National Park Service and privately owned land; most of the private land lies within Section 35. Site elevations range from approximately 4,020 feet in the river bottom, approximately 4,033 feet at the northern project terminus, and approximately 4,047 feet at the southern project terminus. The riverbanks, which consist predominantly of constructed rock walls with some riprap, are approximately 25- feet high, vertical on the southern bank, and steeply sloped on the northern bank.

Average annual precipitation for the Wawona area is approximately 44 inches; however, the upstream reaches of the South Fork Merced River basin receive an average of 50 to 60 inches per year (NPS 2000b). Precipitation in Wawona is predominantly rainfall; however, some winter snowfall does occur.

The South Fork Merced River drains approximately 76,000 acres within the park boundary and approximately 63,000 acres of watershed drains through Wawona. The average mean streamflow at the South Fork Bridge site is approximately 174- cfs and the flood- stage discharge can reach approximately 25,000- cfs. Upstream from Wawona, tributaries to the South Fork enter a steep-walled canyon or glacial gorge, emerging into the large floodplain meadow or deep alluvial valley of the Wawona area (NPS 2000b). Alluvial processes were altered historically due to development related to bridge placement and road construction along streambanks. The South Fork Merced River floodplain within the project site may also be affected by water diversion conducted under the *Wawona Water Conservation Plan* (NPS 1987b), which includes provisions for reduction and/or cessation of withdrawals when streamflow drops to critical levels.

Natural Resources

Geology, Geohazards, and Soils

Geology and Geologic History

Yosemite Valley, Yosemite National Park, and the surrounding Sierra Nevada are well known for their granitic bedrock formations; however, the term *granitic* has been loosely applied to the plutonic (igneous) rocks of the Sierra Nevada batholith and actually represents rock types including diorite, granodiorite, tonalite, and granite of Cretaceous age (100 to 65 million years ago) (Huber 1989).

The Sierra Nevada batholith is comprised of numerous individual rock bodies that were formed from many episodes of magmatic intrusions within the earth's crust. Approximately 70 million years ago the earth's crust overlying the plutonic intrusions eroded and the Sierra Nevada batholith became exposed at the earth's surface. Roughly 50 million years ago, the granitic bedrock had become eroded and formed gentle rolling hills with a topographic relief of little more than a few thousand feet. Water bodies shaping the Sierra Nevada at this time included the slow- moving Merced River. From approximately 10 to 5 million years ago the Sierra Nevada continued to rise in elevation, causing an increase in slope gradient and correspondingly, a higher energy Merced River. By approximately 3 million years ago the Merced River had carved a canyon in the current Yosemite Valley area as much as 3,000- feet deep (Huber 1989).

Three well- documented glacial events have occurred in the Sierra Nevada, all of which have impacted the geomorphology of Yosemite National Park. The most significant and first glacial event may have lasted as long as 300,000 years and ended approximately one million years ago. Glaciation of this time period is classified as Sherwin- age and is credited with shaping Yosemite Valley. Evidence suggests that the valley was filled to its rim by a glacier during this episode that may have extended as far westward as the community of El Portal. Subsequent glacial events consisted of the Tahoe and Tioga glaciations, which likely occurred about 130,000 and 20,000 years ago, respectively; however, neither event generated glaciers as significant, in lateral extent or depth, as the Sherwin- age glacier. Based upon glacial evidence in the Sierra Nevada, the Tahoe-age glacier probably extended farther west and was of greater thickness than the Tioga- age glacier of Yosemite Valley; however, the actual extent is unknown. The Tioga- age glacier only extended as far west as Bridalveil Meadow, as evidenced by a low ridge crossing the valley in this area, which is considered the glacier's terminal moraine. Damming caused by this terminal moraine created prehistoric Lake Yosemite, which eventually filled with sediment and formed the current flat Yosemite Valley floor (Huber 1989).

Project Area Geology

The geology in the vicinity of the South Fork Bridge area has not been studied as extensively as Yosemite Valley; however, the geologic forces that created Yosemite Valley were regional and likely influenced the creation of the South Fork Merced River corridor as well. Accordingly, the South Fork Bridge area is underlain by Sierra Nevada batholith granitics and localized alluvium. A generalized geologic map of Yosemite National Park (Huber and others, in press) shows the underlying bedrock in the vicinity of Wawona and to the east to consist of the "Fine Gold Intrusive Suite" and "Intrusive Suite of Yosemite Valley." Correlation between this and other geologic maps of the area indicate these bedrock types to be comprised of coarse- grained granites and granodiorites (Huber 1989). Both bedrock types are igneous and relatively resistant to weathering. Among some of the oldest rocks found in the Sierra Nevada are those to the west of Wawona. These rocks are metamorphic and are remnants of ancient sedimentary and volcanic rocks that were deformed and metamorphosed, in part by the granitic intrusions (Huber 1989). These metamorphic rocks are less resistant to erosion than the granitics of the Sierra Nevada batholith.

Alluvium of the South Fork Bridge area are comprised of sand, cobbles, and boulders, which is indicative of a relatively high- energy stream environment. Upstream from Wawona, the South Fork Merced River corridor is approximately 11- miles long, situated predominately in an east-west direction, and is relatively straight and symmetrical, which suggests glacial influences. Downstream from Wawona, the South Fork Merced River corridor turns in a northwest direction to its confluence with the Merced River (20 miles downstream) and takes on a more sinuous V- shape characteristic of valleys formed by rivers in more erosive bedrock.

Geologic Hazards

The South Fork Merced River flows through geologically active areas characteristic of the Sierra Nevada, where geologic and hydrologic forces continue to shape the landform. Geologic hazards associated with these forces, such as ground shaking and rockfalls, present potentially harmful conditions to visitors, personnel, and facilities in Yosemite National Park.

Faulting and Seismicity

The Sierra Nevada range in the vicinity of Yosemite National Park is not considered an area of particularly high seismic activity. South Fork Bridge lies in Seismic Zone 3, as defined by the Uniform Building Code Seismic Zone Map (UBC 1997). Throughout recorded history, most earthquakes of Richter magnitude 5 or above have been centered in the eastern Sierra Nevada or in the southern and western portions of California. A relatively small number of earthquakes over magnitude 5, but many earthquakes under magnitude 5, have been generated in the Sierra Nevada batholith. No active or potentially active faults have been identified in the mountain region of Yosemite National Park (CDMG 1994a); therefore, the risk of fault rupture or surface displacement beneath the South Fork Bridge is negligible.

Yosemite can undergo seismic shaking (ground shaking) associated with earthquakes on fault zones on the east and west margins of the Sierra Nevada (CDMG 1994b). Active fault zones in the vicinity of Yosemite include the Bear Mountains fault zone, Sierra Nevada fault zone (including Mono Lake and Hartley Springs faults), seismically and volcanically active areas of the Mono Craters- Long Valley Caldera (including Hilton Creek fault), and various faults within the Owens Valley fault zone (USGS 2002a) (see figures III- 2 and III- 3).

The active Rescue Lineament- Bear Mountains fault extends in a north- south direction within the western foothills of the Sierra Nevada, approximately 60 miles west of Yosemite Valley (USGS 2002a). The Mono Lake Fault is approximately 35 miles northeast of Yosemite Valley and lies along the northern border of the Mono Craters- Long Valley Caldera region (CDMG 1996). Over the last 12 years, the Mono Craters- Long Valley Caldera has been one of the most seismically active regions in California.

Earthquakes have been attributed to movement on the Mono Lake fault and movement associated with resurgent volcanic activity of the Long Valley Caldera. The Mono Craters last erupted 600 years ago and are considered geologically recent. The South Fork Bridge is distant enough to avoid all but ash fall from an eruption in the Long Valley Caldera region. In October 1990, the Mono Lake Fault experienced a 5.7 Richter movement. This earthquake was felt as far west as Sacramento and the San Francisco Bay area and caused landslides and rockfalls at Tioga Pass on the Big Oak Flat Road (McNutt et al. 1991).

The Owens Valley fault, located approximately 100 miles southeast of Yosemite Valley, has experienced movement within the last 200 years, and the California Division of Mines and Geology considers this fault active (CDMG 1994a). The most notable earthquake recorded in Yosemite National Park was the Owens Valley earthquake of March 26, 1872, which is estimated to have had a Richter magnitude of 7.6 and was one of the largest earthquakes in U.S. history (USGS 1991). This earthquake reportedly caused damage in the Sacramento and San Joaquin Valleys and caused significant rockfalls in Yosemite Valley.

Although earthquakes that are felt by people in Yosemite National Park are relatively infrequent, they have occurred in the past and will likely occur in the future. Ground shaking can be expressed as peak acceleration due to gravity as a percent of 1 g (g is acceleration due to gravity, or 32- feet- per- second squared). The potential estimated peak horizontal accelerations produced by the various regional faults in the central California and Sierra Nevada region are relatively low and could range between 0 and 0.2 g (CDMG 1999). Most people would likely feel this range of ground shaking, but structural damage would be negligible to slight in buildings constructed according to modern building standards. Based upon the topographic setting of the South Fork Bridge, seismically induced geologic hazards affecting the bridge would likely only consist of ground shaking.

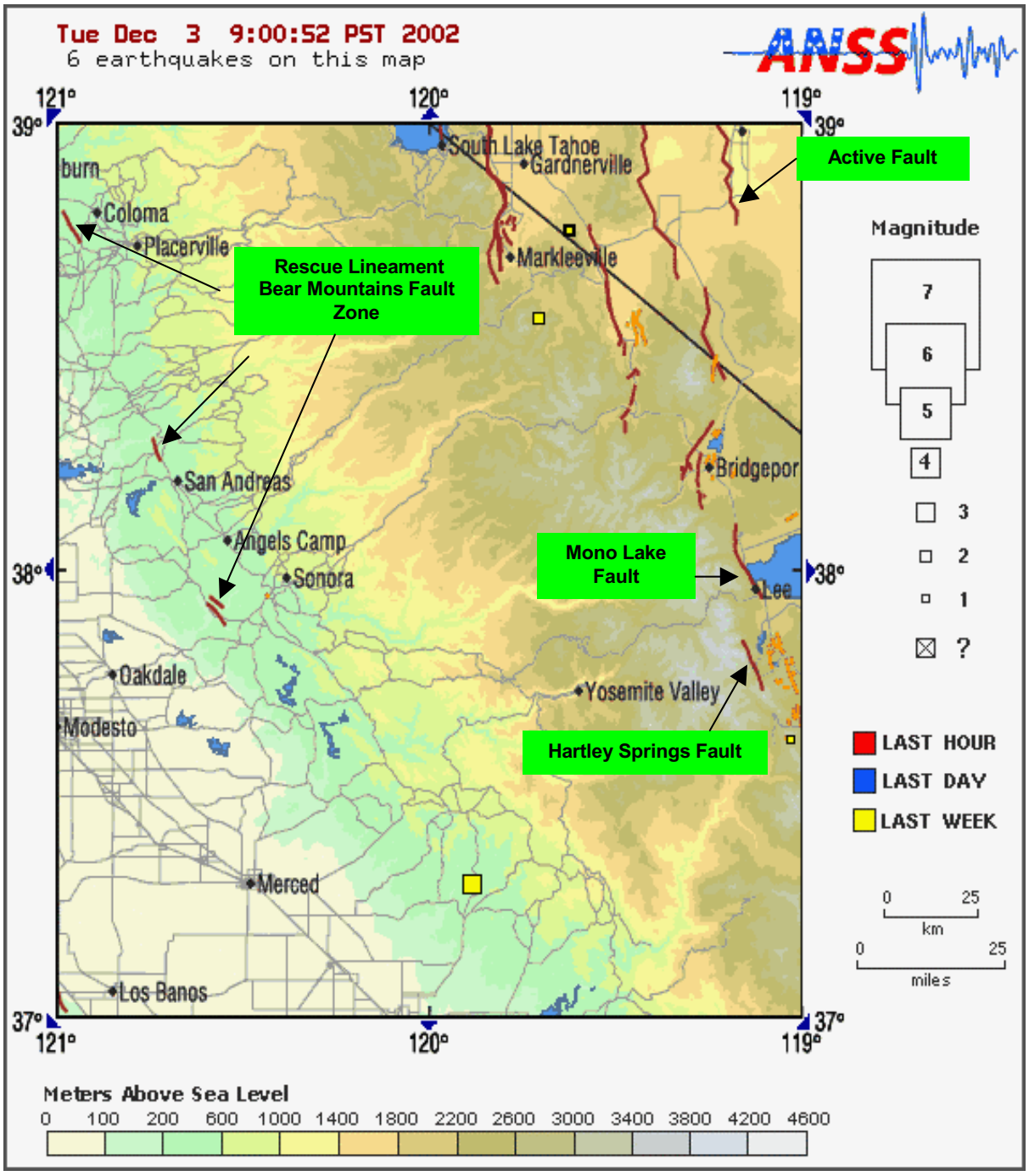

Figure III-2. Faults in the Vicinity of Yosemite National Park

Source: U.S. Geological Survey Earthquake Laterals Program <http://quake.wr.usgs.gov/recenteqs/FaultMaps/120-38.html>

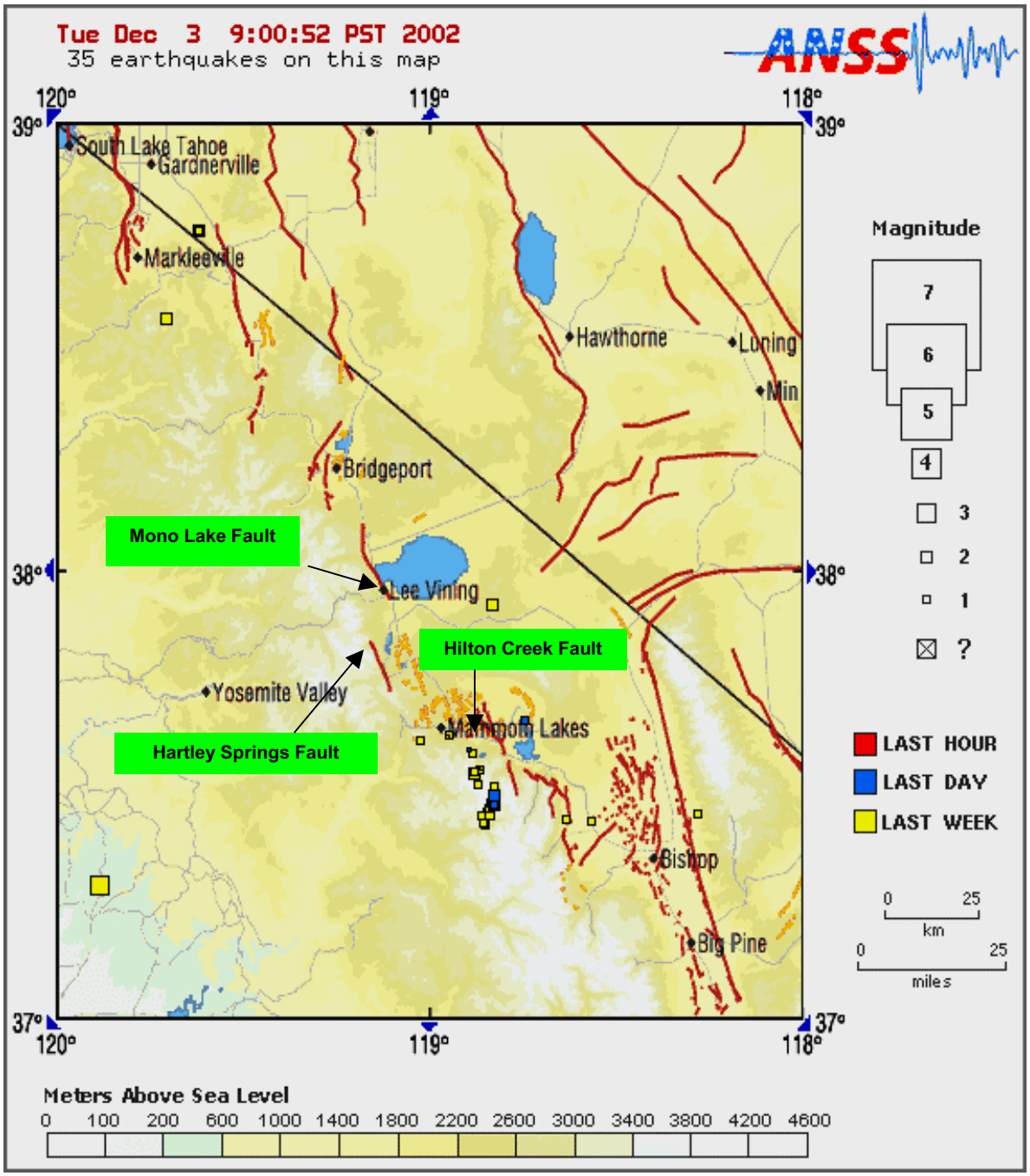

Figure III-3. Faults in the Vicinity of Yosemite National Park

Source: U.S. Geological Survey Earthquake Laterals Program <http://quake.wr.usgs.gov/recenteqs/Maps/119-38.html>

Rockfalls

Rockfall is used as a generic term to refer to all slope movement processes, including rockfall, rockslide, debris slide, debris flow, debris slump, and earth slump. Rocks have become dislodged and fallen off the sheer granite cliffs throughout the geologic history of Yosemite. Rockfalls can displace large volumes of rock and can occur due to such processes as the climate- related expansion and contraction of rock, seismic shaking, or exfoliation.

Most rockfalls are associated with triggering events such as earthquakes, rainstorms, or periods of warming that produce a rapid melting of snow. The magnitude and proximity of the earthquake, intensity and duration of the rainfall, the thickness of the snow- pack, and the pattern of warming, all influence the triggering of rockfalls. However, some rockfalls occur without a direct correlation to an obvious event and are probably associated with gradual stress release and exfoliation of the granitic rocks (USGS 1998).

More than 400 rockfalls have been recorded within Yosemite National Park; some have resulted in injury and, on occasion, death. Rockfalls can also damage or destroy roads, trails, and buildings. Two types of areas of potential rockfall impact have been identified in Yosemite Valley. The first is the area closest to the Valley or canyon walls and is called the talus zone. The second area, referred to as the rockfall shadow zone, extends out from the talus zone and is the area in which rocks may travel out from the talus.

The frequency and magnitude of rockfall events vary considerably. Many small rockfalls may occur every year and go unnoticed, while larger rockfalls occur much less frequently (USGS 1998). The National Park Service, in cooperation with the U.S. Geological Survey, is currently identifying potential geologic hazards in developed areas, including areas most susceptible to rockfalls (USGS 1998). The National Park Service is revising its management policies regarding geologic hazards, with the intent to better protect park visitors and staff by avoiding placement of structures in areas with a high potential for rockfall impact. The vicinity of the South Fork Bridge does not have steep slopes or exposed bedrock surfaces and is not considered to be in an area of rockfall hazards.

Soils

Soils form as a result of the combined effect of several factors, including mineral composition of geologic parent material (bedrock), climate, biologic activity, topographic position/relief, and time. Within the park, topography is the most important factor contributing to soil differentiation. Topography influences surface runoff, groundwater, the distribution of stony soils, and the separation of various- aged alluvial soils (NPS 1980). More than 50 soil types are found within the park; general or local variations depend upon glacial history, microclimatic differences, and the ongoing influences of weathering and stream erosion/deposition.

Soils of the Yosemite National Park region are primarily derived from underlying granitic bedrock and are of similar chemical and mineralogical composition. Various areas have meadow soils consisting of accumulated clays, silts, and organic debris that are subjected to occasional flooding. Colluvial soils have developed along the edges of cliffs where landslides and rockslides have occurred and are composed of various- sized rocks that have high rates of infiltration and permeability. Weathering processes break down talus to smaller- sized particles that are then transported by water and eventually become deposited in alluvial fans or in stream channels. Soils that formed in old river channels consist of alluvial boulders, cobbles, river wash, and loamy sands. These soils have, for the most part, moderate to severe development limitations and thus require the implementation of engineering and mitigation measures.

Six major soil types have been identified for the Wawona area. These soil types consist primarily of residual soils on slopes and alluvial soils on the valley floor. Soil depths vary from 2 to 4 feet in thickness and are moderately to strongly acidic. Soil type classifications are based upon the soil texture and the type of rock fragments contained therein. Table III- 1 lists the soil limitations as they apply to the South Fork Merced River Bridge Replacement Project.

Table III-1. Wawona Land-Use Limitations Based On Soil Type

Soil Type	Roads	Structures
Soboba stony loamy sand	Slight	Severe
Kimmerling silt loam	Severe	Moderate
Calpine sandy loam	Moderate	Moderate
Musick sandy loam	Severe	Moderate
Chaix coarse sandy loam	Severe	Moderate
Stump springs coarse sandy loam	Severe	Moderate

Source: National Park Service, Yosemite Valley Plan 2000b.

Most soils of the Yosemite vicinity have a generally undeveloped profile, indicating their relatively recent origin and young geologic age. The Natural Resources Conservation Service soil survey for Yosemite National Park is in the preliminary stage of development.

Hydrology, Floodplains, and Water Quality

Hydrologic Setting

There are a variety of surface water features in the park, several of which are major attractions for visitors. Yosemite Valley boasts some of the tallest waterfalls in the world, including Yosemite Falls and Ribbon Fall with total drops of 2,425 feet and 1,612 feet, respectively. The Tuolumne and Merced River systems originate along the crest of the Sierra Nevada in the park and have carved river canyons 3,000- to 4,000- feet deep. The Tuolumne River drains the entire northern portion of the park, an area of approximately 680- square miles. The Merced River begins in the park's southern peaks, primarily the Cathedral and Clark Ranges, and drains an area of approximately 511- square miles. Hydrologic processes, including glaciation, flooding, and fluvial geomorphic response, have been fundamental in creating landforms in the park.

The main stem of the Merced River flows from the crest of the Sierra Nevada and through Yosemite Valley, down to the San Joaquin Valley. The upper watershed is entirely within the boundaries of the park. Principal tributaries of the Merced River in Yosemite Valley include Tenaya Creek, Yosemite Creek, and Bridalveil Creek. Historic discharge in the river, measured at the Pohono Bridge gauging station in west Yosemite Valley, has ranged from a high of about 25,000- cfs to a low of less than 10- cfs, with a mean daily discharge of about 600 cfs.

South Fork Merced River Watershed

The South Fork Merced River watershed is located on the western slope of the Sierra Nevada range along the southern boundary of Yosemite National Park. The entire watershed encompasses 241- square miles, with elevations ranging from 1,410 feet at its confluence with the main stem of the Merced River, approximately seven miles west of Yosemite National Park, to

over 11,500 feet along the southeast slope of Merced Peak. The annual mean streamflow of the South Fork Merced River watershed as it reaches the main stem of the Merced River (measured at U.S. Geological Survey gauging station 11268000) is approximately 356- cfs (USGS 2002b), and the average annual total discharge is approximately 250,000 acre- feet.

The upper reaches of the South Fork Merced River display characteristics of an alpine and subalpine stream as it descends in a southwest direction from its headwaters through glaciated valleys at a gradient of about 3,400 feet over 10 miles, or an average gradient of approximately 340- feet per mile (6.4%) (USGS 1992). The South Fork Merced River turns west at about 10 miles from its headwaters and flows at a gradient of 283- feet per mile (5.3%) through the main valley toward the community of Wawona (USGS 1992). The South Fork Merced River and its floodplain is the dominant geomorphic force of the Wawona Valley. Three main tributaries (Big, Chilnualna, and Meadow Creeks) enter the river in the vicinity of Wawona. At Wawona, approximately 95- square miles comprise the South Fork Merced River watershed (FHWA 1994). The annual mean streamflow in the vicinity of Wawona (measured at U.S. Geological Survey gauging station 11267300 between 1959 and 1968) is approximately 174- cfs (USGS 2002c), and the average annual total discharge is approximately 126,000 acre- feet.

Surface water and groundwater are hydraulically connected in the Wawona area. The groundwater flows through upper unconsolidated alluvium or colluvium and underlying fractured undefined bedrock aquifers. Recharge of the shallow groundwater aquifers peaks during the spring snowmelt. Groundwater is used in Wawona for domestic water supplies where approximately 100 groundwater wells support about 260 residents and a store. The South Fork Merced River is the source for the communal water system supporting the remaining residents and all government and concessioner facilities in Wawona (USGS 1996).

The South Fork Merced River exits the park approximately five miles below Wawona and is characterized as a free- flowing river with continual white- water cascades. The canyon associated with this segment becomes sinuous as the river progresses through a V- shaped valley toward its confluence with the main stem of the Merced River (NPS 2000b).

Precipitation

The overall climate of the Yosemite area is temperate, with warm, dry summers and cool, wet winters. About 85% of the local precipitation falls between November and April. December, January, and February have the highest average precipitation, with a monthly average of 6 inches in Yosemite Valley at an elevation of 4,000 feet. The annual mean precipitation for the Wawona area, as recorded over a 30- year period, is approximately 44 inches. Snowmelt drives the peak streamflows that occur in May and June, and minimum river flow is observed in September and October.

Alluvial Processes

Yosemite National Park is comprised of and underlain by igneous granitic rock types, and weathering, erosion, and transportation of sediment is a relatively slow process. Some park valleys have significant soil layers where clays, silts, and organic debris have accumulated with the gravels and sands of the decomposed bedrock. These soils are subject to erosion and alluvial processes, including the development of meandering streambeds, floodplains, and wetlands. River impoundments such as bridges and dams tend to alter the sediment distribution and formative streamflows, thereby disrupting the natural alluvial processes. Unlike Yosemite Valley, the steeper terrain and resulting river gradient in the vicinity of Wawona have played a role in limiting the development of floodplains and wetlands. Wawona Meadow is a 200- acre, low- elevation wetland that is not directly influenced by the South Fork Merced River.

Floodplains

The floodplain plays a necessary role in the overall adjustment of a river system. It exerts an influence on the hydrology of the basin and also serves as temporary storage for sediment eroded from the watershed. Periodic flooding provides sediment and nutrients that are essential for the aquatic and vegetative health of the floodplain. Floodplains are features that are both the products of the river environment and important functional parts of the system. However, human- made structures such as bridges and buildings placed within a floodplain can impede natural flow. Discussion of flooding and floodplains is most relevant in terms of the potential loss of life and the influence on the river by development in the floodplain.

Executive Order 11988 (*Floodplain Management*) and the National Park Service *Floodplain Management Guideline* (NPS 1993b) provide guidance for the protection of life and property in conjunction with natural floodplain values in the National Park System. This guidance applies to both existing facilities and proposed facilities, and requires the National Park Service to avoid locating facilities in floodplains if alternative locations are feasible. Where no alternative exists, and with a formal statement of findings, properly mitigated facilities can be located in floodplains. The U.S. Army Corps of Engineers mapped the 100- year floodplain for Wawona in 1981. In Wawona, which is characterized by an elongated alluvial valley, the river channel can shift laterally during large floods.

The Merced River watershed has had 11 winter floods since 1916 that have caused substantial damage to property. All of these floods took place between November 1 and January 30. The largest floods occurred in 1937, 1950, 1955, and 1997, and had discharge rates in the range of 22,000- to 25,000- cfs, as measured at the Pohono Bridge gauging station in Yosemite Valley. These floods were caused by warm winter rains falling on snow at elevations up to 8,600 feet (e.g., Tuolumne Meadows), partially melting the accumulated snow pack (NPS 2000b).

Bridges rarely span the entire floodplain width of rivers and do not generally span the entire natural channel width and, therefore, constrict flow into the floodplain area. During floods, portions of the river that would normally flow into floodplain areas are forced under the structure, increasing the amount of channel discharge. The effect of these seemingly minor, flow-related changes can be profound, both upstream and downstream of the bridge. The higher discharge and reduced flow area cause a backwater effect (a deep, slow- velocity area) to form upstream and high velocities to occur near and under the bridge opening.

The existing structures at the site are currently impacting the South Fork Merced River channel and floodplain by diverting flows and increasing flow velocity during periods of high discharge. The piers and abutments of the existing South Fork Merced River bridge lie within the river channel and constrict the flow area. This constriction has resulted in the local scouring of the riverbanks downstream from the bridge and of the channel bottom at the base of the abutments and piers. In addition, the existing temporary bridge is placed at an elevation within the 50- year floodplain of the South Fork Merced River. This bridge is placed on shallow concrete spread footings and during a significant flood event there is a risk that the bridge would be washed out and collapse.

During the 1997 flooding event of the South Fork Merced River, the abutments and piers of the original bridge became partially undermined, resulting in its condemnation.

Water Quality

Water quality throughout Yosemite National Park is considered to be good and generally above state and federal standards. The state of California considers the surface water quality of most of

the park's waters to be beneficial for wildlife habitat, freshwater habitat, contact and noncontact recreation, canoeing, and rafting, as indicated in the Central Valley Regional Water Quality Control Board's *Water Quality Control Plan* (*Basin Plan*). An inventory of water quality data performed by the National Park Service indicated excellent conditions in many parts of the park, but some water quality degradation was noted in areas of high visitor use (NPS 1994a). Surface water quality of the South Fork Merced River is characterized by near excellent conditions in most areas and some water quality stresses near human development. Water quality is considered excellent at the intake for Wawona and residents use both surface and groundwater as potable water.

Water quality has been affected by the extensive and concentrated visitor use of the main stem of the Merced River in popular areas. High use of the streambank induces bank erosion through the loss of vegetative cover and soil compaction. Bank erosion can result in the widening of the river channel and loss of riparian and meadow floodplain areas. Water quality is then altered through increased suspended sediments due to erosion, higher water temperatures from a lack of riparian cover, and lower dissolved oxygen levels due to elevated temperatures and shallower river depths (NPS 2000b). In addition, studies have indicated a presence of *Giardia lamblia* and fecal coliform in various surface waters throughout the park, thereby limiting direct consumption of surface water by humans.

Nonpoint source runoff from roads and parking lots may potentially affect water quality by introducing organic chemicals and heavy metals. Areas of concentrated livestock use, including livestock trails used for concessioner- led trail rides, introduce nutrients and sediments contributed through erosion, while the developed areas introduce various pollutants associated with human waste and debris. The Wawona Golf Course presents a potential nonpoint pollution source due to the occasional use of fertilizers and pesticides (including herbicides) to maintain the golf course green, although the kinds of pesticides used and their application and disposal are strictly controlled. The Wawona Golf Course is also used as a spraying field for reclaimed water from the Wawona wastewater treatment facility.

Point sources of pollution are discharges that can be traced to a single point or location, such as a pipe or other device. Water quality impacts from wastewater may occasionally occur as a result of sewerline blockage and wastewater backup and overflow. A tertiary wastewater treatment plant serves most of the public and private sources in Wawona; the treated wastewater is augmented by surface water draws from the South Fork Merced River (up to 500,000- gallons per day in August) used to irrigate the Wawona Golf Course. During winter months, the treated wastewater is discharged into the South Fork Merced River when storage capacity is insufficient and disposal to the golf course is not feasible due to snow cover.

Wetlands

Wetland Classification and Definition

Wetlands in the project area are described using the Cowardin wetland classification system (USFWS 1979). This system classifies wetlands based on vegetative lifeform, flooding regime, and substrate material. Under this system, wetlands are defined as: "lands in transition between terrestrial and aquatic systems, where the water table is usually at or near the surface or the land is covered by shallow water." To be considered wetlands under this definition, habitats must possess one or more of the following attributes: (1) the land supports predominantly hydrophytes, at least periodically. Hydrophytes are plants that grow in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; (2) the substrate is predominantly undrained hydric soils. Hydric soils are wet long enough to periodically produce

anaerobic conditions; and/or (3) the substrate is saturated with water or covered by shallow water at some time during the growing season of each year (USFWS 1979).

Wetlands are ecologically productive habitats that support a rich array of both plant and animal life. Wetlands sustain a variety of hydrologic and ecologic functions necessary for ecosystem integrity, including: (1) flood abatement, (2) sediment retention, (3) groundwater recharge, (4) nutrient capture and recycling, and (5) plant and animal diversity (USFS 1995). For this reason, modification of wetlands, even small areas, can induce effects that are proportionally greater than elsewhere in an ecosystem (UC Davis 1996b).

Wetland Classes

Five wetland classes (USFWS 1979; NPS 2000b) have been identified for the South Fork Merced River: (1) riverine upper perennial—main channel; (2) palustrine emergent—emergent wetland (marsh or meadow) habitat along the river, subject to various flooding regimes; (3) palustrine forest—riparian forest habitat along the river subject to various flooding regimes; (4) palustrine scrub- shrub—riparian scrub habitat, principally willow species, growing along the river subject to various flooding regimes; and (5) lacustrine limnetic—natural deep- water lakes. Two of the above- listed wetland classes occur within the South Fork Bridge site—the riverine upper perennial and the palustrine scrub- shrub classes. Additionally, a palustrine emergent wetland class is present within Angel Creek, a tributary drainage located on the edge of the southwestern project quadrant.

The South Fork Merced River channel bottom is classified as riverine upper perennial (NPS 2000b), and includes the main channel of open flowing water and the unvegetated rock and cobble substrate. This channel is approximately 110- feet wide and is armored with large cobble, gravel, and rock across the full width. River cobble and rock function to provide substrate for algae and semi- aquatic organisms within this South Fork Merced River reach. In addition, the cobble and rock function to armor the riverbed, reducing channel down- cutting and meandering. The South Fork Merced River channel would be subject to jurisdiction by the U.S. Army Corps of Engineers, under Section 404 of the Clean Water Act, as nonwetland waters of the United States.

Two sparse, palustrine scrub- shrub stands dominated by sandbar willow occupy an approximately 45- foot- wide low- flow channel along the north side of the river, and a small patch of sandbar willow is present on the west side of the bridge. The sparse stands are located east of the South Fork Bridge and continue beyond the temporary Bailey bridge. Sandbar willow shrubs dominating the sparse stands are growing from small cobble bars, are less than 5- feet tall, and provide less than 15% foliar cover. A few clumps of sedge and occasional horsetail or scouring- rush plants are associated with the sparse willow shrubs within the low- flow channel. Sparse stands of sandbar willow function to provide limited wildlife habitat structure (perches, cover for fisheries and aquatic organisms, etc.) within the river environment. The roots serve to anchor cobble and gravel and contribute to armoring the riverbed from down- cutting and meandering. Short shrubs and sedge clumps growing within flowing water and on cobble beds add to the scenic values sought by park visitors. The sparse palustrine scrub- shrub stands would be subject to jurisdiction by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act, as wetlands.

Adjacent to the southwestern project site quadrant, Angel Creek, a small tributary drainage, enters the South Fork Merced River approximately 50- feet downstream from the bridge abutment. Angel Creek forms a boundary between the project site and the golf course and is dominated by a dense palustrine emergent stand of horsetail or scouring- rush, sedge, rush, thistle, willow, cut- leaved blackberry, and blackberry. Because of its proximity to the golf course, the creek receives multiple pulses of pesticides and herbicides during the growing season. Surface

water was present in this drainage, flowing in a stream approximately 5- feet wide. The palustrine emergent wetlands of Angel Creek function to improve water quality by capturing sediments washed from the adjacent overflow parking area, provide habitat for a variety of wildlife species, recharging the groundwater table, and providing protection of the creek bottom from erosion and release of sediments to the South Fork Merced River. The shrubs and trees present along the palustrine emergent wetland margin also serve to screen or frame (depending on visitor expectations) views of the golf course from the roadway. The palustrine emergent stand along Angel Creek would be subject to jurisdiction by the U.S. Army Corps of Engineers, under Section 404 of the Clean Water Act, as wetlands.

Sparse scrub-shrub wetland

NPS Photo

Biotic Communities

Vegetation

This section provides a description of the riparian and upland plant communities associated with the South Fork Bridge site. The site has been subject to previous disturbance related to the temporary Bailey bridge installation and overflow parking activities, and historic disturbance due to construction and maintenance of the original bridge structure. As a result, some areas are devoid of vegetation, i.e., covered with asphaltic concrete (access road to and across the Bailey bridge) or consist of soil and small gravel (overflow parking areas), or are only sparsely vegetated. Additional vegetation information, including in- depth descriptions of plant communities, distribution, habitat requirements, community sensitivities, and species list by association may be obtained from the *Vegetation Management Plan* (NPS 1997a). In general, the South Fork Merced River flows through lower montane and deciduous forests in the vicinity of Wawona (NPS 2000b).

Riparian Plant Communities

Narrow bands of mixed palustrine forest and lower montane tree species occupy the riverbanks adjacent to the bridge abutments. These stands consist of ponderosa pine, white alder, and incense- cedar in the overstory. To the east of the temporary bridge, on the north riverbank, Douglas- fir and California black oak trees are also present in the palustrine forest community. Understory shrubs and sapling trees observed in the palustrine forest community include California coffee- berry, incense- cedar, and ponderosa pine. Species of understory forbs observed within this community included bedstraw and horsetail or scouring rush. The non-native cut- leaved blackberry was observed trailing along the rock wall of the southern riverbank.

Riparian trees immediately adjacent to the existing bridge abutments are approximately 40 to 60 feet in height and are typically less than 18- inches in diameter at breast height. National Park Service (2000a) states that California black oak may have been the dominant floodplain tree of the South Fork Merced River historically; however, fire suppression has resulted in present- day ponderosa pine dominance and incense- cedar understory dominance.

Riparian habitat adjacent to South Fork Bridge

NPS Photo

On the upper bank of Angel Creek, at the edge of the overflow parking area, a small stand of very large ponderosa pine and incense- cedar trees are present. These trees exceed 70- inches diameter at breast height. Adjacent to the temporary bridge, the bases of a ponderosa pine tree (approximately 50- inches basal diameter) and a white alder with three main trunks (approximately 16- inches basal diameter each) are present; removed to allow proper installation of and safe travel (sight distance) on the temporary bridge structure.

Upland Plant Communities

Upland vegetation of the South Fork Bridge site is relatively sparse and has been disturbed over the years, primarily by roadway maintenance, temporary bridge installation and access paving, and overflow parking. The southwestern quadrant supports no vegetation due to extensive use of this area for overflow parking as a result of visitors wishing to ride the shuttle bus that loads on a

large parking lot across the highway. The southeastern, northeastern, and northwestern project quadrants (relative to the river and highway intersection) support scattered ponderosa pine seedlings, saplings, and trees, but are mostly dominated by herbaceous species. Common herbaceous species observed growing on these three quadrants included the forbs aster, western sagewort, peppergrass, rockcress, sheep sorrel, mullein, and crane's bill, and the grasses blue wildrye, bentgrass, foxtail barley, and brome among others.

Several of the herbaceous species are non- native or have been introduced into Yosemite National Park environs and persist on disturbed roadside soils.

Wildlife

This section provides a general description of wildlife within the project site and area. Because of the South Fork Bridge location within a developed area with high levels of traffic, wildlife species using site habitats are those that are more tolerant of human presence. Coupled with heavy visitation and the relatively high number of residents in Wawona, there have been many human/wildlife conflicts. These conflicts usually include the presence of human food that is improperly stored or disposed (garbage) (NPS 2000b). Such conflicts can lead to property damage and/or threats to human safety, principally from black bears. The park has prepared a *Human/Bear Management Plan* (NPS 1997b) with the goal of restoring the natural ecology, distribution, and behavior of black bears through control of human activities.

The National Park Service (2000a) listed wildlife species common to montane riparian and ponderosa pine habitats as the Pacific tree frog, western fence lizard, sharp- tailed snake, western rattlesnake, red- tailed hawk, American kestrel, acorn woodpecker, warbling vireo, western screech and long- eared owls, belted kingfisher, cliff and violet- green swallows, black phoebe, song sparrow, brush rabbit, mountain beaver, mountain pocket gopher, deer mouse, striped skunk, coyote, and black bear.

The South Fork Merced River fishery is composed of introduced brook, rainbow, and brown trout (NPS 2000b). There is less angler pressure on the South Fork Merced River overall than on the Merced River main stem due to difficulty of access and terrain (NPS 2000b). Aquatic habitat under the South Fork Bridge is predominantly riffles, although a small pool has formed in the scour hole adjacent to the northernmost pier.

Special-Status Wildlife Species

The federal Endangered Species Act of 1973, as amended, requires all federal agencies to consult with the U.S. Fish and Wildlife Service prior to taking actions that could jeopardize the continued existence of species that are listed or proposed to be listed as threatened or endangered, or could result in the destruction or adverse modification of critical or proposed critical habitat. The first need in the consultation process is to obtain a list of protected species from the U.S. Fish and Wildlife Service, which was accomplished October 2, 2002, for this project (USFWS 2002).

The Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (Section 1508.27) also require considering whether the action may violate federal, state, or local law or requirements imposed for the protection of the environment. For this reason, species listed under the California Endangered Species Act or accorded special status (i.e., considered rare or sensitive) by the California Department of Fish and Game are included in this analysis, as are species designated as rare by the park.

South Fork Bridge Special-Status Species

Critical Habitat

Critical habitat has not been designated for any federally listed species that is known or has the potential to occur within the project area.

Species Considered

A total of 60 special- status species (55 wildlife and 5 plant species) have been considered in the assessment of the proposed project (see Appendix C). Species evaluated include federally listed threatened or endangered species; species of concern (former federal Category 2 species); state-listed threatened, endangered, and rare species; and species that are locally rare or threatened that are known to be or could be present within the planning area. The species list was generated based on data gathered from the National Park Service, U. S. Fish and Wildlife Service, and the California Natural Diversity Database (CDF&G 1999; USFWS 2002).

Special-Status Species Retained in this Analysis

Of the special- status species evaluated (Appendix C), the project area contains suitable habitat for 32 special- status plant and wildlife species. The federally threatened bald eagle and California red- legged frog (possibly extirpated from Yosemite National Park) may occur, along with the California endangered willow flycatcher, peregrine falcon, and great gray owl, the remaining wildlife and plant species are listed by the federal and/or state government as species of concern.

The species accounts presented below provide a brief overview of special- status species that have potential to occur within the project area. The remaining special- status species and determinations are described in Appendix C. Additional data and information for special- status species are included in the biological assessment for the *Yosemite Valley Plan*.

Federally Listed Threatened or Endangered Species

Bald Eagle

The bald eagle is currently listed as a federal threatened (proposed for delisting) and California endangered species. Bald eagles are transient within Yosemite National Park, including the project area, foraging seasonally over lakes, rivers, and open terrain. Sightings are rare and are most often reported for Yosemite Valley, El Portal, and Foresta. There are no bald eagle nests within the park or project area; however, a pair has successfully nested near, but outside, the park border at Cherry Lake in Stanislaus National Forest. This nesting pair forages over Lake Eleanor, which is located inside the park boundary. There is forage habitat for the bald eagle within the project area.

Bald eagles underwent steep population declines due to effects from pesticide uptake from the food chain; however, populations rebounded following the ban of DDT. Originally listed as federally endangered, the bald eagle was reclassified as threatened, and is currently under consideration for delisting.

California Red-legged Frog

The California red- legged frog is currently listed as a federal threatened and California species of concern. Recent field surveys conducted in Yosemite National Park found no California red-

legged frogs (UC Davis 1995; USGS 1997; USGS 1999b). This species probably occurred in the Yosemite Valley, El Portal, Foresta, and Wawona areas historically. The California red- legged frog prefers deep pools with dense stands of overhanging willows and an intermixed fringe of cattails (USFS 1988). Suitable habitat for this species occurs within the channel of the South Fork Merced River in the project vicinity.

Federal Species of Concern

Wawona Riffle Beetle

The Wawona riffle beetle is currently listed as a federal species of special concern. The type locality for this species is near Wawona, where it has been collected historically in 1954 and 1991 (ESA 2002). The South Fork Merced River was sampled in the vicinity of the project area (95 sites between the Wawona Campground and the impoundment near the Seventh Day Adventist Camp) for Wawona riffle beetle presence during late September of 2002 (ESA 2002). No life stage of the Wawona riffle beetle was found; however, suitable habitat for the species is present and it has been previously observed and collected in this river reach (Chandler 1954; Shepard and Barr 1991), and in the Merced River main stem (USGS 1999a; ESA 2001). It was anticipated that the Wawona riffle beetle would be observed if surveys were conducted during the summer months (June, July, August) rather than in the fall (late September) (ESA 2002).

The Wawona riffle beetle is widely distributed, having been observed in Humboldt, Mariposa, Plumas, Shasta, Tehama, Siskiyou, and Trinity Counties in California, and locations in Idaho and Oregon (ESA 2002). Observations within the park have occurred near Wawona (South Fork Merced River) and at the Pohono Bridge and El Capitan Moraine (Merced River). Habitat supporting the Wawona riffle beetle includes aquatic mosses, particularly *Platyhypnidium riparioides,* that grows on rocks and boulders in streams and rivers. Aquatic mosses were observed to be present at numerous locations scattered along the South Fork Merced River and Merced River main stem (ESA 2002). While most numerous within mats of moss, the Wawona riffle beetle has also been found clinging to submerged roots of riparian trees and Indian rhubarb (ESA 2002). Suitable habitat for this species is present within the project area; however, the Wawona riffle beetle has not been observed.

Foothill Yellow-legged Frog

The foothill yellow- legged frog is currently listed as a federal species of concern. Recent field surveys within Yosemite National Park found no foothill yellow- legged frogs (UC Davis 1995; USGS 1997). Suitable habitat for this species occurs in the Yosemite Valley, Foresta, Wawona, and El Portal. The yellow- legged frog prefers streams with at least 40% riffles and 40% cobble- sized or greater substrates (USFS 1988). Suitable habitat for this species is present in the project area; however, the foothill yellow- legged frog has not been observed.

Northwestern Pond Turtle and Southwestern Pond Turtle

The two subspecies of pond turtle are currently listed as federal species of concern. Yosemite National Park represents a zone of intergradation between these subspecies of pond turtle, where interbreeding makes them indistinguishable. Park records show sightings of this species in Yosemite Valley and at El Portal; however, suitable habitat also occurs at Wawona (NPS 2000b). This species is found in the Sierra Nevada up to 6,000 feet in elevation and prefers permanent ponds, rivers, streams, and ditches. They also require basking areas that include logs, rocks, vegetation mats, or open banks. The pond turtle species depend on upland habitats where individuals over- winter, construct nest chambers, and lay eggs. The upland areas are typically

covered by grassland or shrubby vegetation. Suitable habitat for both subspecies is present in the project area; however, they have not been observed.

Harlequin Duck

The harlequin duck is currently listed as a federal and California species of concern. A pair of harlequin ducks was observed on the Merced River within Yosemite National Park during 2000; however, no recent nesting within park boundaries has occurred and the species was presumed extirpated from the park (NPS 2003a). It is likely that harlequin ducks still breed, but rarely in California. The last known breeding pair observed within the Sierra Nevada was on the upper Mokelumne River in Amador and Calaveras Counties in the late 1970s; however, potential breeding habitat in California has yet to be adequately surveyed. Both wintering and breeding populations of the harlequin duck have declined throughout California, probably due to human disturbance along breeding streams, including damming. Harlequin ducks are considered to be at the extreme southern limit of occupied range in California, wintering in marine waters along rocky coasts from San Luis Obispo County north. They breed inland along fast- flowing, shallow rivers and streams. This species is known to have been reported historically in the Wawona area; however, there have not been recent observations.

California Spotted Owl

The California spotted owl is currently listed as a federal and California species of special concern. During surveys and inventories of distribution and abundance conducted within the park from April through August of 1988 and 1989, California spotted owls were observed or heard at 58 locations. Surveys were conducted by California Department of Fish and Game biologists and resulted in discovery of two nest trees and four locations with young California spotted owls. National Park Service wildlife staff have confirmed California spotted owl sightings near Happy Isles, Mirror Lake, Yosemite Chapel, and at the base of Cathedral Rocks in Yosemite Valley (NPS 2003a). This species is also known from observations within 1.5 miles of Wawona (NPS 1996a).

The California spotted owl has been observed from the southern Cascade Range, the entire Sierra Nevada, and in the Central Coast Ranges. Approximately 1,600 nesting pairs and territorial single California spotted owls had been documented in the Sierra Nevada through 1993 (NPS 2003a). Preferred habitat includes lower elevation (up to 7,600- feet elevation) red fir forest to lower elevation forests (3,000- to 7,000- feet elevation) dominated by ponderosa pine and species of oak. The presence of black oak in the forest canopy enhances habitat quality for this species. Roosting and nesting habitat for the California spotted owl includes large trees within dense forests having canopy closure of greater than 70%. Nests are usually constructed in tree cavities, on broken trees and snags, abandoned nests of other species, or in clumps of mistletoe. Breeding typically occurs near mid- February, eggs are laid and incubated from early April through mid-May, and fledging occurs from mid- to late- September. Suitable habitat for this species is present in the project area; however, the California spotted owl has not been observed.

American Dipper

The American dipper is currently listed as a federal species of concern. This species occupies montane streams, primarily swift- flowing, less frequently found along mountain ponds and lakes (NatureServe 2002). This species can regularly be seen on the Merced River throughout the Yosemite Valley and in El Portal (NPS 2003b).

Vaux's Swift

Vaux's swift is currently listed as a federal species of concern. It is moderately widespread in the west, with spotty distribution. This species occupies mature forests, but also forages over open country. It has occurred in mature and old- growth coniferous, hardwood, and mixed forests and riparian habitats. Suitable habitat for this species is present in the project area; however, the Vaux's swift has not been directly observed.

Olive-sided Flycatcher

The olive- sided flycatcher is currently listed as a federal species of concern. This species occupies coniferous, hardwood, and mixed forest stands, and woodlands, including riparian habitat. The primary habitat is mature, evergreen montane forest. Suitable habitat for this species is present in the project area; however, the olive- sided flycatcher has not been observed.

Black Swift

The black swift is currently listed as a federal species of concern. This species is an aerial- feeding bird that forages over forest and in open areas. It nests behind or next to waterfalls and wet cliffs. Suitable habitat for this species is present in the project area, but the black swift has not been observed.

Hermit Warbler

The hermit warbler is currently listed as a federal species of concern. This species occupies conifer and mixed conifer forests, shrublands, and woodlands. It prefers mature stands of pine and fir, with large trees and dense cover. Douglas- fir is an important tree species in the breeding habitat (NatureServe 2002). Suitable habitat for this species is present in the project area, but the hermit warbler has not been observed.

Rufous Hummingbird

The rufous hummingbird is currently listed as a federal specis of concern. This species occupies conifer forest and woodland, alpine areas, grasslands, shrublands, and orchards. It is associated with old- growth coniferous forest stands, but will breed in second- growth stands (NatureServe 2002). Suitable habitat for this species is present in the project area, but the rufous hummingbird has not been observed.

White-headed Woodpecker

The white- headed woodpecker is currently listed as a federal species of concern. This species occupies coniferous forest and woodland habitats, descending to lower elevations during the winter season. They prefer montane coniferous forest, primarily mature pine and fir (NatureServe 2002). Suitable habitat for this species is present in the project area, but the white- headed woodpecker has not been observed.

Nuttall's Woodpecker

Nuttall's woodpecker is currently listed as a federal species of concern. This species occupies hardwood forest and woodland habitats and chaparral shrublands. It prefers oak forest and woodland, chaparral, and riparian types (NatureServe 2002). Suitable habitat for this species is present in the project area, but the Nuttall's woodpecker has not been observed.

Pacific Fisher

The Pacific fisher is currently listed as a federal and California species of concern. Preferred Pacific fisher habitat occurs within the Wawona area, and in recent years, the majority of reported sightings (road- killed animals) have occurred along Wawona Road and Big Oak Flat Road near Henness Ridge and Crane Flat, respectively. The Pacific fisher prefers mixed conifer - montane hardwood forest habitat with large diameter trees and a moderate to dense canopy cover. The elevational range for the species is 4,000 to 6,000 feet. Suitable habitat for this species is present in the project area; however, the Pacific fisher has not been observed.

Pale Townsend's Big-eared Bat

The pale Townsend's big- eared bat is a federal and California species of concern. The species has not been identified for Wawona or the project area, but available habitat suggests it could be present in the area. It is a cave- dwelling species and occurs in a variety of habitats, typically shrub- steppe or forest edge (NatureServe 2002).

Pacific Western Big-eared Bat

The Pacific western big- eared bat, also known as Townsend's big- eared bat, is currently listed as a federal and California species of concern. The species was captured in mist net surveys conducted at Wawona, in close proximity to the South Fork Merced River (Pierson and Rainey 1995). In addition, this species was captured at Mirror Lake, Cook's Meadow, El Capitan Meadow, and Yosemite Creek.

The Pacific western big- eared bat is found from low desert to mid- elevation montane habitats, although it has been observed up to 10,000 feet elevation. It tends to concentrate in areas with caves or mines that are used as roosting sites. This species forages near native vegetation and feeds primarily on small moths. Although the species has been observed in the project area, available habitat suggests it could be present in the project area, and it has been observed nearby.

Spotted Bat

The spotted bat is currently listed as a federal and California species of special concern. Acoustic data collected in 1994 suggest there is a significant population of spotted bats in the Wawona area (Pierson and Rainey 1995). The species is considered to be one of the rarest mammals in North America; it is known from only about 25 sites in California (CDF&G 1990; Pierson and Rainey 1998). Although the species has not been observed in the project area, available habitat suggests it could be present and it has been observed nearby.

The spotted bat is a solitary cliff- dweller, and its distribution is closely linked to the availability of cliff roosting habitat (Pierson and Rainey 1997). It is found using a wide variety of habitats from low desert to coniferous forests. The species forages over meadows, along forest edges, or in open coniferous woodland, predominantly for moths. Although the species has not been observed in the project area, available habitat suggests it could be present in the project area, and it has been observed nearby.

Greater Western Mastiff-Bat

The greater western mastiff- bat is currently listed as a federal and California species of special concern. The greater western mastiff- bat has been captured in the Wawona area, in addition to the Yosemite Valley, Bridalveil Meadow, El Capitan Meadow, Leidig wetlands near Happy Isles, and at upland sites east of El Capitan Meadow and Sentinel Picnic Area. The Yosemite Valley has

the highest population of greater western mastiff- bats in any locality surveyed in California (Pierson and Rainey 1995). Although the species has not been observed in the project area, available habitat suggests it could be present and it has been observed nearby.

The greater western mastiff- bat is found along the west side of the Sierra Nevada at low- to mid-elevations, but has been detected up to 10,000 feet elevation. It occupies a variety of habitats from desert scrub to montane coniferous forest. The species distribution can be related to the availability of suitable roosting habitat and also the basis of significant rock features (e.g., large granite formations). The species forages in the open, and may travel up to 25 miles to reach feeding areas. It is often detected over desert washes, grasslands, or meadows, but also feeds above the forest canopy, mostly on moths. Although the species has not been observed in the project area, available habitat suggests it could be present and it has been observed nearby.

Small-footed Myotis Bat

The small- footed myotis bat is currently listed as a federal and California species of special concern. The small- footed myotis bat was captured in the Wawona area using mist netting in 1994 (Pierson and Rainey 1993, 1995). This species is considered a common bat of arid uplands in California; it is found on both the east and west sides of the Sierra Nevada.

The small- footed myotis bat occurs in a variety of habitats, primarily in relatively arid, wooded, and brushy uplands near water. The species is found from sea level to 8,800 feet in elevation. They are commonly observed foraging among trees and over open water, feeding primarily on small flying insects. Although the species has not been observed in the project area, available habitat suggests it could be present and it has been observed nearby.

Long-eared Myotis Bat

The long- eared myotis bat is currently listed as a federal and California species of special concern. The long- eared myotis bat was captured in the Wawona area using mist netting in 1993 (Pierson and Rainey 1993). Mist net surveys were also conducted at Wawona in 1994, and the long- eared myotis bat was captured on the Wawona Golf Course and along the South Fork Merced River (Pierson and Rainey 1995). This species is widespread in California, but is generally believed to be uncommon in most of its range. Although the species has not been observed in the project area, available habitat suggests it could be present and it has been observed nearby.

The long- eared myotis bat occupies nearly all shrub, woodland, and forest habitat types from sea level to 9,000 feet elevation. This species is dependent on oak trees for roosting (Pierson 2000). They forage among trees, over water, over shrubs, and prefer the riparian habitat edge. Preferred insects and arthropods include beetles, moths, flies, and spiders.

Fringed Myotis Bat

The fringed myotis bat is currently listed as a federal and California species of special concern. The fringed myotis bat is considered likely to occur in the project area, but the Wawona area was not surveyed for this species during 1993–1994 field efforts. This species was captured at Cook's Meadow and Yosemite Creek.

The fringed myotis bat is found in low desert scrub to high elevation coniferous forest habitats. They are found in the Sierra Nevada in deciduous and mixed conifer habitats to about 6,500 feet elevation. The species tends to forage over water in river corridors, and the primary diet consists of beetles. Although the species has not been observed in the project area, available habitat suggests it could be present and it has been observed nearby.

Long-legged Myotis Bat

The long- legged myotis bat is currently listed as a federal and California species of special concern. The long- legged myotis bat was not recorded during recent surveys within the park, but it is expected in the available habitats, including those found at Wawona and the project area.

The long- legged myotis bat is found in a variety of habitats in the Sierra Nevada, including shrub, woodland, and forest habitat from sea level to 9,000 feet in elevation. It is highly dependent on oak trees for roosts; however, it may also roost in mines, rock crevices, or buildings. The species forages over open areas at tree- canopy height and feeds primarily on moths.

Yuma Myotis Bat

The Yuma myotis bat is currently listed as a federal and California species of special concern. The Yuma myotis bat was captured in Wawona and along the South Fork Merced River near Wawona during recent mist- netting surveys (Pierson and Rainey 1993, 1995). It was also captured at Pate Valley, Mirror Lake, El Capitan Meadow, Yosemite Creek, and Yosemite Valley.

The Yuma myotis bat is found in a wide variety of habitats in the Sierra Nevada below 8,000 feet. The species is relatively tolerant of humans and has been observed roosting under bridges (Wildlife Society 1998). Typically, the species roosts in trees, mines, caves, rock crevices, and buildings. The species forages directly over open water surfaces and relatively still water, including ponds, pools in streams, and rivers.

California Threatened and Endangered Species

Willow Flycatcher

The willow flycatcher is listed by the state of California as an endangered species (CDF&G 1999). Two subspecies—the willow flycatcher and the little willow flycatcher—may occur within Yosemite National Park. There are recent records of willow flycatchers within the park, at Wawona Meadow, Hodgdon Meadow, and Westfall Meadow. The species formerly nested in the Yosemite Valley, but were last observed there in 1966. The entire state population of willow flycatchers is thought to number approximately 200 pairs (CDF&G 1991).

The willow flycatcher is a neotropical migrant that breeds in riparian and moist meadow willow thickets in the United States. Within California, it is a rare to locally uncommon summer resident in wet meadow and montane riparian habitats, from 2,000 to 8,000 feet in elevation. An association between meadow size and the occurrence of the willow flycatcher, i.e., they prefer larger meadows, has been determined (CDF&G 1982). Potential foraging and perching habitat for the willow flycatcher is present in the project area; however, it has not been observed.

American Peregrine Falcon

The American peregrine falcon has been removed from the threatened and endangered species status and is currently federally delisted. However, this species is listed as endangered by the state of California. There are currently three active nest sites in the Yosemite Valley and one historic nest site in the Merced River canyon. A pair appeared to be nesting on Wawona Dome during 1990, but no young were fledged, and there have been no subsequent observations of peregrine falcons at this location. Prior to 1978, there was a 37- year absence of nesting records for the American peregrine falcon in Yosemite National Park, which generally coincides with declines in numbers in the U.S. and Europe (UC Davis 1984). American peregrine falcons require vertical cliff habitat with large potholes or ledges that are inaccessible to land predators. They appear to prefer

sheer cliffs at least 150- feet high that have a large cave or overhung ledge to accommodate nestlings (Monk et al. 1988). This species forages over a variety of Sierra Nevada habitats primarily supporting populations of band- tailed pigeons, woodpeckers, and jays. Suitable foraging habitat for the American peregrine falcon is available within the project area; however, the American peregrine falcon has not been observed.

Great Gray Owl

The global range of the great gray owl reaches its farthest southern extent in the Sierra Nevada, with the total population in California estimated to be between 100 and 200 birds. Declines of great gray owls in California may be due to habitat degradation from logging, grazing, and development. Yosemite National Park has the highest concentration of this species, probably because the park contains the most intact habitat.

Preferred breeding habitat of great gray owls is pine and fir forests near montane meadows. Nests are established in the tops of large- diameter broken snags. At the latitude of Yosemite National Park, high summer temperatures are an important factor affecting nesting success, so suitable nest snags must have abundant shade. Hunting occurs in meadows, where small mammals such as voles and gophers are taken. In winter, the great gray owls descend to meadows as low as 2,000 feet in elevation.

Areas in Yosemite National Park of know great gray owl breeding include Crane Flat and meadows along Glacier Point Road. Known wintering areas include Big Meadow in Foresta and Wawona. Yosemite Valley appears to contain good wintering habitat, but observations of great gray owls in this location are rare. This may be due to the high level of human disturbance in the Valley. Suitable habitat for this species is present in the project area, but the great gray owl has not been observed.

Special-Status Vegetation

Small's Southern Clarkia

Small's southern clarkia is currently listed as a park rare species and a California species of special concern. This annual forb is endemic to California and restricted to Madera, Mariposa, and Tuolumne Counties. It is found in foothill woodlands and lower montane forests (open ponderosa pine forests) between 2,400 and 6,300 feet elevation (NatureServe 2002), and has been identified in open areas at Foresta. Suitable habitat for this species is present in the project area, but Small's southern clarkia has not been observed.

Rawson's Flaming-trumpet

Rawson's flaming- trumpet is currently listed as a California species of special concern. This species is found in California and Oregon, growing on cool, shaded substrates near streams, from 3,000 to 6,000 feet in elevation (NatureServe 2002). Suitable habitat for this species is present in the project area, but it has not been observed.

Yosemite Lewisia

The Yosemite lewisia is currently listed as a California species of concern. This species occupies lower montane coniferous forest, pinyon- juniper woodland, and upper montane coniferous forests, growing on sandy soils derived from granite (NatureServe 2002). Suitable habitat for this species is present in the project area, but the Yosemite lewisia has not been observed.

Air Quality

The primary factors that determine air quality are the locations of air pollutant sources, the types and amounts of pollutants emitted, meteorological conditions, and topographic features. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants.

Climate and Meteorology

The state of California is divided into air basins that are defined partly by their meteorological and topographical characteristics. The South Fork Bridge is located near the boundary of two air basins: the Mountain Counties Air Basin and the San Joaquin Valley Air Basin. Figure III- 5 shows both air basins and their location in California.

The South Fork Merced River lies within the Sierra Nevada mountain range, which roughly parallels the eastern boundary of California and extends from the Cascades Range in the north to the Tehachapi Mountains in the south. Mountain climatic zones are characterized by considerable vertical wind motion and by winds and temperatures different from those in the valleys. During the warm season of the year, wind circulation in the mountain zones is generally upslope, with only brief periods of downslope winds at night. During the cold season, wind circulation in the absence of storm activity is generally downslope, with brief periods of upslope winds on south- facing slopes (NPS 2000b).

While air quality in a given basin is usually determined by emission sources within the basin, it can also be affected by pollutants transported from upwind air basins by prevailing winds (NPS 2000a). For instance, the California Environmental Protection Agency concluded that all of the ozone exceedances in 1995 (see table III- 2) in the southern portion of the Mountain Counties Air Basin (i.e., Tuolomne and Mariposa Counties) were caused by transport of ozone and ozone precursors from the San Joaquin Valley Air Basin (California Environmental Protection Agency 1996b). Air quality in the Mountain Counties Air Basin is heavily influenced by pollutant transport from the metropolitan Sacramento and the San Francisco Bay areas (NPS 2000a).

Air Quality Designation and Ambient Air Quality Standards

As designated under the Clean Air Act, air quality in Yosemite National Park is Class I, indicating the lowest allowable increments of air quality degradation (USEPA 2002). This air quality classification is aimed at protecting parks and wilderness areas from air quality degradation. The act gives federal land managers the responsibility for protecting air quality and related values from adverse air pollution impacts, including visibility, plants, animals, soils, water quality, cultural and historic structures and objects, and visitor health.

Air pollutants in the park originate primarily from populated areas outside the park boundary. However, vehicle traffic on the South Entrance Road and in visitor use areas of the Wawona area contributes to local air quality degradation. Vehicle emissions alone generally do not cause major parkwide air pollution increase, but they are of concern in the park because of incremental additions to other sources of pollution (NPS 1996a).

Figure III-5. California Air Basins

The federal Clean Air Act requires the U.S. Environmental Protection Agency to identify National Ambient Air Quality Standards (national standards) protective of public health and welfare. Currently, the U.S. Environmental Protection Agency has established national standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter 10 microns or less in diameter (PM- 10), particulate matter less than 2.5 microns in diameter (PM- 2.5), and lead. California has adopted more stringent standards for most of the criteria air pollutants (referred to as State Ambient Air Quality Standards, or state standards). Table III- 2 includes the national and state standards for ozone and PM- 10.

Table III- 3 shows the current attainment/nonattainment designations for the applicable subregions within the Mountain Counties and San Joaquin Valley Air Basins. As illustrated, the portion of the Mountain Counties Air Basin within Mariposa County is designated as nonattainment for state ozone and PM- 10, but is designated attainment or unclassified for the other state air quality standards and all of the federal standards. The San Joaquin Valley Air Basin is designated as nonattainment for both state and national ozone and PM- 10 standards (NPS 2000a).

Air Quality Monitoring Data

Federal, state, and local agencies operate a network of monitoring stations throughout California to provide data on ambient concentrations of air pollutants. Table III- 2 summarizes recent monitoring data from the monitoring stations in the vicinity of South Fork Bridge. Three of the stations are located in Yosemite National Park (Turtleback Dome, Wawona, and Yosemite Valley Visitor Center), and one is located outside of the park, approximately 12 miles west of Wawona, in the Sierra National Forest (Jerseydale). Wawona, Yosemite Valley Visitor Center (in Yosemite Village), and Jerseydale are approximately 4,000- feet above sea level, and Turtleback Dome is approximately 5,300- feet above sea level. As shown in table III- 2, exceedances of state and national standards for ozone and state standards for PM- 10 are recorded on occasion within the park and in the vicinity of the park (NPS 2000b).

Soundscapes and Noise

By definition, noise is human- caused sound that is considered to be unpleasant and unwanted (NPS 2000b). Whether a sound is considered unpleasant depends on the individual listening to the sound, and the activity being performed by the individual when the sound is heard (e.g., working, playing, resting, sleeping). While performing certain tasks, people expect, and therefore accept, certain sounds. For instance, if a person works in an office, sounds from printers, copiers, and typewriters are generally acceptable and not considered unpleasant or unwanted. By comparison, when resting or relaxing, these sounds are not desired. Sounds that people may desire during these times are referred to as natural quiet, a term used to refer to ambient (outdoor) natural sounds without intrusion of human- caused sounds. Natural quiet can be essential in order for some individuals to achieve a feeling of peace and solitude (NPS 2000b).

Natural sounds within Yosemite National Park and adjacent to the South Fork Merced River are not considered to be noise. These sounds result from natural sources such as waterfalls, flowing water, animals, and rustling tree leaves. Existing noise within the park results from mechanical sources such as motor vehicles, generators, and aircraft overflights, as well as from human activities such as talking and yelling (NPS 2000b).

Table III-2. Recent Ozone and PM-10 Concentration Data for Yosemite National Park and Vicinity

Pollutant	National Standard	State Standard	Monitoring Data By Year							
			1994	1995	1996	1997	1998	1999	2000	2001
Ozone Monitoring Data										
Station: Yosemite National Park – Turtleback Dome										
Highest 1-hr. avg., ppm[a]	0.12	0.09	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.10**	**0.12**	**0.11**
Days over state standard[b]			10	11	9	3	10	4	3	3
Days over national standard			0	0	0	0	0	0	0	0
Highest 8-hr. avg., ppm	0.08	N/A	**0.10**	**0.10**	**0.09**	**0.10**	**0.10**	**0.09**	**0.10**	**0.10**
Days over national standard			12	11	10	3	9	4	6	4
Station: Yosemite National Park – Wawona										
Highest 1-hr. avg., ppm[a]	0.12	0.09	**0.10**	**0.11**	**0.10**	ND	ND	ND	ND	ND
Days over state standard[b]			1	9	8					
Days over national standard			0	0	0					
Highest 8-hr. avg., ppm	0.08	N/A	**0.08**	**0.09**	**0.09**	ND	ND	ND	ND	ND
Days over national average			0	2	1					
Station: Sierra National Forest – Jerseydale (approximately 12 miles west of Wawona)										
Highest 1-hr. avg., ppm[a]	0.12	0.09	ND	**0.11**	**0.11**	**0.12**	**0.11**	**0.16**	**0.12**	**0.12**
Days over state standard[b]				16	26	7	12	13	9	3
Days over national standard				0	0	0	0	1	0	0
Highest 8-hr. avg., ppm	0.08	N/A	ND	**0.10**	**0.11**	**0.11**	**0.10**	**0.11**	**0.10**	**0.10**
Days over national standard				22	30	7	14	21	14	7
Particulate Matter (PM-10) Monitoring Data										
Station: Yosemite Village – Visitor Center										
Highest 24-hr. avg., µg/m^3[a]	150	50	**115**	**71**	**106**	**62**	40	**82**	**98**	**312**
State exceedances/samples[c]			14/60	5/56	4/46	1/56	0/56	2/55	2/73[d]	8/61[d]
National exceedances/samples			0/60	0/56	0/46	0/56	0/56	0/55	0/73	1/61
Annual geometric mean, µg/m^3	50	30	27.8	24.2	20.3	19.6	18.0	ND	ND	ND

[a] *ppm = parts per million; µg/m^3 = micrograms per cubic meter.*

[b] *"Days over standard" refers to the number of days in a given year during which the ozone concentration over at least one hour exceeded the hourly state or national standard.*

[c] *PM-10 is usually measured every sixth day (rather than continuously like other pollutants). For PM-10, "exceedances/samples" indicates the number of exceedances of the state standard that occurred in a given year and the total number of samples that were taken that year.*

[d] *The California Air Resources Board lists the number of days that a sample exceeded the state/national standard, but does not list the number of samples taken for that particular year. They do calculate an estimated number of exceedances had PM-10 samples been taken each day of the year (365 days). The number of sampling events for these years was calculated by taking the exceedances estimated for 365 days (e.g., in 2000 the estimate was 15.0 exceedances in 365 days, or 15/365) and making it equivalent to the number of actual exceedances for the number of samples (e.g., in 2000, the number of actual exceedances was two in an unknown number of sampling events, or 2/x). An equation of 15/365 = 2/x was used to determine the number of sampling events (x) in 2000. The same relationship was used to calculate the number of sampling events for 2001.*

NOTE: NA = Not applicable. ND = No data available. Values shown in bold type exceed the applicable standard.

SOURCE: National Park Service 1996a, 2000a, and California Environmental Protection Agency, Air Resources Board, "California Air Quality Data," 1995, 1996a, 1997, 2001, 2002a; California Ambient Air Quality Data 1980–1999, Data CD, Nov. 2000b.

Table III-3. Air Basin Attainment / Nonattainment Designations

Pollutant	National	State
Mountain Counties Air Basin		
Ozone[a]	Attainment[c]	Nonattainment[c]
Carbon Monoxide	Unclassified / Attainment	Unclassified[d]
Nitrogen Dioxide	Unclassified / Attainment	Attainment
Sulfur Dioxide	Unclassified	Attainment
Particulate Matter (PM-10)[b]	Unclassified	Nonattainment[d]
Lead	Not Classified	Attainment
San Joaquin Valley Air Basin		
Ozone[a]	Nonattainment	Nonattainment
Carbon Monoxide	Unclassified / Attainment	Unclassified[c]
Nitrogen Dioxide	Unclassified / Attainment	Attainment
Sulfur Dioxide	Unclassified[c]	Attainment
Particulate Matter (PM-10)[b]	Nonattainment	Nonattainment
Lead	Not Classified	Attainment

[a] *Current designations for the national ozone standard apply to the 1-hour-average standard. USEPA has not yet designated areas for the recently established national 8-hour-average ozone standard, but is likely to designate Mariposa and Madera Counties as nonattainment for the 8-hour national ozone standard based on existing monitoring data (California Environmental Protection Agency 2000a).*

[b] *Since monitoring for PM-2.5 began in 1998, air basins will not be classified with respect to the new national PM-2.5 standard until 2000 or later.*

[c] *County-specific designation. Unless otherwise noted, designations apply to the entire applicable air basin.*

[d] *Designation applies to the portion of Mariposa County that lies within Yosemite National Park.*

Source: California Environmental Protection Agency, Air Resources Board, 1998, 2000a, 2002b.

Existing Noise Sources

Motor Vehicles

The noise environment at the South Fork Bridge is primarily influenced by automobiles entering or leaving the park via Wawona Road. Automobiles on roadways leading to visitor facilities, including trails, campgrounds, the gas station and restaurant, the Pioneer Yosemite History Center, the Wawona Information Station (summer only), and the other amenities at Wawona, also contribute to the noise environment in the project area. Noise from motor vehicles is obviously loudest immediately adjacent to roadways; however, given the generally low background sound levels at the park, noise can be audible a long distance from a roadway. Atmospheric effects (e.g., wind, temperature, humidity, rain, fog, and snow) and topography (e.g., echo from canyon walls) can significantly affect the presence or absence of motor vehicle noise in various areas of the South Fork Merced River corridor.

Aircraft

As part of a report to Congress (NPS 1994b), the National Park Service conducted a visitor survey that included questions related to aircraft noise in the park. Of the visitors surveyed, 55% reported hearing aircraft at some point during their visit (NPS 2000b). The report states that recognition of noise from aircraft was highly variable from location to location. Visitor impacts were considered greater for activities where individuals were removed from automotive

transportation and areas where other visitors were present. In Yosemite, a majority of the complaints concerning aircraft noise were from wilderness trail users (NPS 2000b).

Other Sources

Other mechanical sources of noise within the park include roadway construction equipment, generators, radios, and park maintenance equipment (i.e., mowers and chainsaws). The frequency and use of these sources vary both by season and reason for use (NPS 2000b).

Background Sound/Noise Levels

Current sound levels adjacent to the South Fork Merced River vary by location and also by season (the volume of water in the rivers being lower in the fall and higher in the spring). Current noise levels are also influenced by the number of visitors to the park and by the proximity of mechanical noise sources (NPS 2000b).

Sound and noise levels are measured in units known as decibels (dB). For the purpose of this discussion, sound and noise levels are expressed in dB on the "A"- weighted scale (dBA). This scale most closely approximates the response characteristics of the human ear to low- level sound. Human beings have a wide range of hearing, from the threshold of hearing (0 dBA) to the threshold of pain (140 dBA).

In preparing the *Merced Wild and Scenic River Comprehensive Management Plan/Final Environmental Impact Statement* (NPS 2000b), sound- level measurements were obtained at various locations adjacent to the Merced and South Fork Merced Rivers (from the headwaters to the base at Vernal Falls). Measurements were obtained with a Larson Davis dosimeter (Model 700) calibrated with a Larson Davis sound- level calibrator. At each measurement location, observations of the background level were made over a period ranging from one to five minutes. In addition, observers noted the sources contributing to the background level and noted any sources that caused intrusive levels above the typical background level (NPS 2000b).

Sound levels taken in the middle of the old Wawona bridge (South Fork Bridge) measured 50 dBA, with a maximum observed level of 59 dBA near the bridge. These measurements were recorded at 10:30 A.M. on a Sunday in September 1999. Observers noted that most of the noise was associated with the use of the Wawona Store east of the roadway (i.e., people talking or yelling, buses idling, vehicle traffic noise). The maximum noise level was obtained when a truck crossed the temporary Bailey bridge at the project site (NPS 2000b).

Sensitive Receptors

Some land uses are considered more sensitive to ambient noise levels than others due to both the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities involved. Residences, motels and hotels, schools, libraries, churches, hospitals, and parks and other outdoor recreation areas are generally more sensitive to noise than commercial and industrial land uses.

Facilities located within two miles of the South Fork Bridge would be considered sensitive receptors. In the southwest project quadrant, a portion of the Wawona Golf Course would fall within this zone. Most visitor activity is within the southeast project quadrant, which supports the shuttle bus loading area, parking lots, the Wawona Store, a gas station, the covered bridge, Wawona Campground, ranger office, some private residences, and a horse camp. The Wawona Hotel complex also lies within this southeast project quadrant, but is separated from the project

site by a low ridge. In the northeast project quadrant, the principle noise receptors would include the Pioneer Yosemite History Center and the water and wastewater treatment plants. The northwest project quadrant supports a picnic area that would be considered a sensitive noise receptor.

Regulatory Standards

Generally, the federal government establishes standards for transportation- related noise sources that are closely linked to interstate commerce such as aircraft, locomotives, and trucks—for those sources, state governments are preempted from establishing more stringent standards. State governments establish noise standards for those transportation- related noise sources that are not preempted from regulation, including automobiles, light trucks, and motorcycles. Noise sources associated with industrial, commercial, and construction activities are generally subject to local control through noise- related plans and policies (NPS 2000b).

Summary

Although noise is not specifically addressed in the classification criteria for the National Wild and Scenic Rivers system, the presence of noise can reduce visitor enjoyment and degrade the immediate environment adjacent to a river. Depending on the area, noise sources adjacent to the South Fork Merced River include motor vehicles, aircraft, and human activity such as talking and yelling. Measured sound levels indicate the background (minimal) sound level near the project site is between 50 and 59 dBA (NPS 2000b).

Cultural Resources

The Wawona area includes evidence of thousands of years of human occupation. The prehistory of the Wawona area is similar to that of Yosemite Valley, which was first inhabited by people between 4,000 and 6,000 years ago; however, human occupation seems to have occurred in the Wawona area somewhat earlier than it did in Yosemite Valley. Portions of the Wawona area have been designated an archeological district eligible for listing in the National Register of Historic Places. There are at least 72 sites within the archeological district boundaries that contain either prehistoric, historic, or both ages of resources.

At approximately 9,500 years ago, there is preliminary evidence near El Portal of prehistoric utilization of the area. An Early Prehistoric use of the area (9,500–8,000 years ago) follows, which is characterized by a culture apparently focused on hunting, and plant processing to a much lesser degree. This period is followed by the oldest well- established occupation of the Merced River corridor, termed the Intermediate Prehistoric (8,000–3,200 years ago). It is represented by hundreds of archeological sites, and is indicative of a more diverse subsistence with an abundance of milling sites, in addition to and in conjunction with, lithic scatters. This period grades into a Late Prehistoric use of the area (3,200 years ago–circa AD 1800) with environmental and cultural change noted. During this time, the bow and arrow are introduced and the Mariposa Complex (identified after AD 1350), characterized by large, permanent village habitations near major streams, is archeologically recognized as predominately representing the pre- contact Sierra Miwok.

After 1800, American Indians resident to this area were the Southern and Central Sierra Miwok, some Mono Lake Paiute, and a few individuals from the disbanded missions. The Western Mono and Chukchansi Yokuts may also have traversed the upland areas of this region. Between 1848–1851, recorded accounts indicate that Euro- Americans arrived and began prospecting, hunting,

and trapping, with cultural tensions leading to the Mariposa Indian War in 1851. Although treaties were made following the war, these were not ratified by the U.S. Congress and left the American Indians landless and without rights (NPS 2000b). However, as the popularity of Yosemite Valley grew, many American Indians found employment in the valley and continued to live in the area. Today, American Indian people continue to live in and around the park, and many are locally employed.

At present, seven American Indian tribes claim traditional associations with lands of Yosemite National Park. The National Park Service has formally consulted with three tribal groups regarding the bridge replacement: the American Indian Council of Mariposa County, Inc. (the political organization representing the Southern Sierra Miwok tribe), the North Fork Mono Rancheria, and the Picayane Chukchansi. Individuals from most of the tribes represented by these organizations continue to maintain cultural associations with lands and resources in the park through traditional ceremonies, gathering of traditional plants, and other activities.

In 1833, the first Euro- American party of explorers, hunters, and trappers entered the region of the Yosemite Valley. The 1840s and early 1850s were a culturally tumultuous period during which Euro- American miners further encountered American Indian villages along the waterways of the region. In 1853, after the 1851 Mariposa Indian War, Galen Clark explored the South Fork Merced River, Wawona Meadow, and Yosemite Valley. He established Clark's Station in 1857 (a resting place for travelers) along Wawona Meadow, and in 1858 constructed a log bridge over the South Fork Merced River to facilitate wagon crossings. Several roads were established linking the station with the Mariposa Grove of Giant Sequoias and Yosemite Valley, both established as preserves in 1864.

Between 1875 and 1883, the (currently known) Wawona Hotel and area where Clarks' Station once stood were deeded to Henry Washburn who added the roof to the covered bridge upstream from the present South Fork Bridge. The period between 1885 and 1907 saw increasing interest in the area by renowned artists, dignitaries, and tourists as accessibility was expanded through the building of the Southern Pacific Railroad, with access from Merced to El Portal. Automobiles were first allowed in the park in 1914 and quickly became the dominant mode of travel through the park. Highway 41 was completed as a year- round through- route in 1933, opening routes to the Wawona area from both the north and south.

Archeological Overview and Resources

To date, approximately 6% of Yosemite National Park has been inventoried for archeological resources and over 1,100 archeological sites have been documented. Most of the inventories focus on lower elevation developed areas and road corridors; however, some wilderness areas have been surveyed. In most cases, inventories have been conducted in support of park development projects as part of the environmental and historic preservation compliance process. The most recent comprehensive overview of archeological resources and their information value is presented in *An Archeological Synthesis and Research Design for Yosemite National Park, California* (NPS 1999). This document summarizes the results of past archeological research and presents research questions and methodologies for improving understanding of prehistoric and historic lifeways in the Yosemite region.

In general, archeological sites are important for the information provided regarding prehistoric and historic lifeways. Prehistoric and historic American Indian sites are important to Indian people as a tangible link with the past. Historic archeological resources in the Wawona area are primarily associated with its development for tourism and its use as a travel corridor (the southern entrance to the park).

The Wawona area, which contains many archeological sites indicative of the substantial prehistoric and historic habitation of this area, has been one of the most intensively examined areas in Yosemite National Park. Studies have included research- driven assessments, as well as those undertaken in compliance with cultural resource laws and regulations. The latter include investigations in support of planning and development for a wastewater treatment plant in 1981, and for construction of sewage system trench lines in 1984. These projects prompted a third excavation project in the Wawona Basin. One such study reported on test and data recovery excavations at 10 sites during the 1985 and 1986 field seasons (Hull 1989). Based on these results, it was determined that a certain phase of sites, the Tamarack Phase, was located on upper terraces of the Merced River, while sites of the Mariposa and Crane Flat Phases were located on lower terraces on the riverbank.

Wawona Archeological District

The existing South Fork Bridge, and the Wawona area in general, have been the subject of archeological and historical interest for at least a century, and the focus of numerous evaluations and mitigation actions undertaken within the past few decades in compliance with federal and state cultural resource laws and regulations.

The first formal documentation and consultation occurred in 1978, when many sites in the Wawona area were nominated to the National Register of Historic Places as an archeological district because of the presence of "significant prehistoric and historic archeological resources" (Anderson and Hammack 1978). The Wawona Archeological District was determined eligible for listing in the National Register of Historic Places on December 7, 1978, based upon the presence of 72 historic, prehistoric, or multi- component sites within the district boundaries. The significance of the district lies in its ability to provide information pertaining to subsistence strategies, seasonal use of specific ecological zones, demographic patterns, and both historic Miwok and pre- Miwok occupation of the area.

Archeological Sites

One archeological resource currently designated CA- MRP- 171/H, is located within the South Fork Bridge project area. This site, which has been the subject of many years of study and interest, was originally recorded as CA- MRP- 171 and –172 (Bennyhoff 1952, 1956). As originally reported, the site consists of surface obsidian flakes and a midden (deposit of refuse, shells, etc.) area located on the north side of the river, just west of Wawona Road and the South Fork Bridge. During its original recordation, it was assessed as covering approximately 150,000- square meters (37.07 acres). Various elements of the site were recorded between 1952 and 1992, and assigned separate designations, although all are now combined under CA- MRP- 171.

Situated predominately on the north bank of the South Fork Merced River, the site, as now defined, consists of surface features including several bedrock milling stations (sites where dried fruits and nuts, such as acorns, were processed into flour by grinding with a stone or stone mortar, leaving a depression (milling stick) or hole (mortar cup) in the bedrock) containing numerous mortar cups and some milling slicks, and one, faded red- lined pictograph panel. A widespread area of obsidian flaked debris and fire- affected rock dominates the surface archeology. Artifact- bearing subsurface midden deposits are widespread and extend to depths of 230 centimeters (cm) (7.55 feet) in the northern site area (Ervin 1984); however, no features, either historic or prehistoric, have been located to date. Historic artifacts located on the surface and in subsurface contexts include small, mainly localized, surface concentrations of refuse.

This archeological site is well known and has been of interest to the professional archeological community, as well as the general public, minimally since the formation of the park. Formal

consultation between the National Park Service and the California State Historic Preservation Office regarding the eligibility of the site for inclusion in the National Register of Historic Places was initiated in 1994, in preparation for the proposed removal of the South Fork Bridge. The site, which consists of several localities indicative of historic and prehistoric utilization of the landscape, has been formally determined eligible for listing in the National Register of Historic Places as a contributing element of the Wawona Archeological District.

Between May and July 1994, the National Park Service undertook archeological investigations at CA- MRP- 171/H. Excavations were structured in two phases: testing and data recovery. Archeological methods employed and research questions addressed during these investigations are outlined in a project- specific research design (NPS 1994c) that was based in part on the theoretical direction presented in the parkwide research design (Moratto 1981), and on current research in the park and the region. The subsurface testing phase was designed to systematically determine the structure, integrity, and data potential of the archeological deposit within the context of National Register of Historic Places criteria. Based upon this evaluation, the data recovery phase focused on evaluating the cultural deposit directly within the area of potential effect for the proposed South Fork Merced River Bridge Replacement Project.

Ethnographic Overview and Resources

American Indian people continue traditional cultural associations with parklands and resources, including plant- gathering areas, spiritual places, places that are prominent in oral traditions, and historic village locations. Also of importance is the protection of ancestral burial areas. Little formal research has been conducted to inventory and document significant traditional resources; however, one study has been conducted in the Yosemite Valley. Only incidental information exists for the Wawona area; very little ethnographic resource information has been documented for wilderness areas adjacent to the Wawona area. A parkwide Ethnographic Overview was prepared during the 1970s, but has not been revised with current information. Some ethnohistory studies that were focused on the Yosemite Valley and El Portal were conducted, as were cultural affiliation studies focused in both the northern and southern segments of the park. A cultural affiliation study is currently underway to identify places, tribal groups, and families associated with the Wawona area. Parkwide archeological evidence indicates that for more than 3,000 years, American Indians practiced localized harvesting, pruning, irrigation, and vegetation thinning (NPS 2000b).

One study identified and documented cultural and natural resources associated with American Indian occupation and use of the Yosemite Valley (Bibby 1994). As a result of these and other studies and consultations, at least 104 sites, features, and plant species have been identified as having been and/or are currently used by American Indians. Forty- seven sites were either historic villages or features, 16 sites have mythic or ceremonial value, 27 sites are food and water sources, 20 sites have plants used in making baskets or other utilitarian objects, and four sites contained medicinal plants. The most important plants identified for ethnographic purposes were California black oak stands and individual trees, willows, grasses, sedges, rush, mosses, and mushrooms. Features were included and consisted of bedrock mortars, human habitation areas, sites with traditional and contemporary spiritual value, gravesites, and areas used for resource gathering and food processing.

The National Park Service consults with American Indians concerning management of park lands, especially with regard to undertakings and park resources of concern, including:

- Access to park areas
- Gathering of plant materials for food, medicinal, and utilitarian purposes
- Protection of historic lifeways

The National Park Service is required to consult on the basis of government- to- government relations with federally recognized American Indian tribes, and on an information basis with non- federally recognized tribes. The National Park Service has also: (1) entered into an agreement with the American Indian Council of Mariposa County, Inc., for purposes of traditional practices and the establishment of an Indian Cultural Center at the site of the last historic village in the Yosemite Valley (west of Camp 4); and (2) worked with park- affiliated American Indian groups to develop a plan consistent with the Native American Graves Protection and Repatriation Act to address inadvertent discoveries of human remains, burial objects, sacred objects, and objects of cultural patrimony. The Southern Sierra Miwok have the closest cultural ties to lands and resources in Wawona, although the North Fork Mono and Chukchansi Yokuts also have some association with these lands and resources.

Cultural Landscape Overview and Resources (Including Historic Sites and Structures)

Comprehensive inventories and evaluations of historic sites, structures, and cultural landscape resources have been undertaken within Yosemite National Park. According to Director's Order–28: *Cultural Resources Management Guidelines* (NPS 1991), a cultural landscape is:

> …A reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.

Cultural landscapes are the result of the long interaction between humans and the land, and the influence of human beliefs and actions over time on the landscape. Shaped through time by historical land- use and management practices as well as politics, property laws, technology, and economic conditions, cultural landscapes provide a living record of an area's past. Cultural landscapes are continually reconfigured and are, therefore, a good source of information for specific time periods as well as being reflective of long- term use, thus presenting a preservation challenge. Yosemite National Park and the Wawona area of the South Fork Merced River corridor contain nationally significant historic resources such as designed landscapes and developed areas, historic buildings, and circulation systems (trails, roads, and bridges) that provide visitor access.

A cultural landscape study of the Wawona area, focusing on Washburn Company holdings, has been undertaken and is reported in the *Merced Wild and Scenic River Comprehensive Management Plan/ Final Environmental Impact Statement*. The lands historically associated with the Wawona Hotel are bisected by Wawona Road, which runs southeast to northwest through the area. A cultural landscape study completed in 2000 identifies three major components of the interrelated landscape: the Wawona Hotel area (and golf course), the Pioneer Yosemite History Center, and the Day Use/Service Area (Historical Research Associates 2000).

Wawona Hotel Area (and Golf Course)

The focal point for the Wawona Hotel area landscape is the Wawona Hotel complex, a National Historic Landmark, located approximately 1,300 meters (4,265 feet) east of the South Fork Bridge. The hotel was listed in the National Register of Historic Places in 1975, and with associated structures, constitutes the core of the developed area of Wawona.

The Wawona Hotel was constructed in 1875, but was destroyed by fire and reconstructed in 1878. This Victorian hotel complex provides lodging and amenities for park guests and continues to serve in that capacity today. Six other principal buildings, comprising the core complex, are located on a knoll overlooking the Wawona Meadow. The hotel complex was designated a National Historic Landmark in 1987 due to its architectural features and its historical associations with early California commerce and landscape painter Thomas Hill. Four additional historic buildings, all associated with hotel operations, are located outside of the main complex. Three are near the hotel on the north side, while a fourth—the slaughterhouse—is isolated from the others within a stand of trees at the north end of the Wawona Meadow.

Historic Wawona Hotel

NPS Photo

The Wawona Golf Course, in operation since 1918, occupies a large portion of the Wawona Hotel property south of Wawona Road. Constructed within the north end of Wawona Meadow, the golf course represents the closest feature of the hotel area landscape component to the South Fork Bridge, extending to within 100 meters (328 feet) to the south.

The hotel resort complex once encompassed other facilities that still are part of the cultural landscape, such as the Wawona Covered Bridge and neighboring structures that have been converted to historical and interpretive uses, as well as properties that exist today as archeological or landscape features (e.g., historic ditches such as the Washburn Ditch that once provided all of the domestic water for the operation of the hotel, foundations, dumps, pastures, fences, and orchards). Also included is the first wagon road into Wawona, the Chowchilla Mountain Road, originally constructed in the late 1800s to link Wawona with the Mariposa area. Galen Clark's home, located adjacent to the Wawona Golf Course, may exist as an archeological resource. The area may also include remnants of cavalry action that are historically significant. Also extant in the Wawona developed area are several Civilian Conservation Corps structures, such as the National Park Service Maintenance Complex and ranger office and three residences constructed immediately after the Wawona land purchase in 1932. These structures and features constitute the two remaining components of the Wawona Cultural Landscape.

Pioneer Yosemite History Center

The Pioneer Yosemite History Center, located on the banks of the South Fork Merced River approximately 320 meters (1,050 feet) east of the proposed project, includes a collection of structures relocated from other areas of the park assembled to interpret the history of the area. The Wawona Covered Bridge typically provides access to the center from the Wawona Hotel

complex; however, the bridge is currently undergoing rehabilitation due to damage from flooding.

Public Service/Day Use Area

The South Fork Bridge is nearest the most recently added component of the Wawona Cultural Landscape. This is the public service/day use area, consisting of a variety of buildings that provide services to Yosemite National Park visitors. This area is located immediately northwest of the main hotel building complex, and extends to the banks of the South Fork Merced River. This area is located north of Wawona Road, between the Wawona Hotel and the Pioneer Yosemite History Center. Forest Drive physically separates this landscape area from the project site.

This area provides guest services such as a gas and service station, a small store (now commonly referred to as the Wawona Store), a picnic area, and a comfort station. A parking area serves this collection of buildings and also provides parking for the Pioneer Yosemite History Center landscape component, located on the north side of the river. Although the exact date of construction of the Wawona Store is unknown, it was present in 1954. Two other structures are located north of Forest Drive, one west of the trail to the Wawona Covered Bridge and one on the east end of the public parking area.

South Fork Bridge

The South Fork Bridge was originally constructed as a rustic style structure characterized by massive log stringers and a wooden guardrail that gave the bridge the appearance of log construction. This type of construction was applied to other bridges of the 1920s and 1930s. It was built to replace the historic Wawona Covered Bridge as the main crossing for Wawona Road (HAER No. CA- 113).

The South Fork Bridge (located within the boundaries of the Wawona Archeological District) is not eligible for the National Register of Historic Places due to lack of architectural integrity. This determination was made during consultation between the park and the California State Historic Preservation Office, and was due to the changes and rehabilitation to the bridge over the years. These changes were made due to the effects of high flows during flood events (CDHP 1996). This bridge is a noncontributing element to the Wawona cultural landscape evaluated during 2000, although it does reside within the cultural landscape boundaries.

In June 1995, the National Park Service, Denver Service Center, requested a formal determination of the eligibility of the South Fork Bridge for listing in the National Register of Historic Places (NPS 1995). The request was prompted by a National Park Service proposal to replace the bridge due to structural and safety issues. The formal consultation was necessary because the bridge was over 50 years old and, therefore, considered a historic resource. In a letter to the California State Historic Preservation Office, the National Park Service (1995), cites a Historic Resource Study undertaken in 1987 by Linda Wedel Greene that evaluated the historical significance and integrity of the South Fork Bridge and assessed its eligibility for listing in the National Register of Historic Places (NPS 1995). This study (NPS 1987) recommended that the historic bridge structure was not eligible for listing due to damage and reconstructions (since its original construction in 1931) that had compromised its architectural and historic integrity.

It was also noted that in 1993, Harlan Unrau of the National Park Service, Denver Service Center, concurred with this finding, stating that the South Fork Bridge "does not display the same outstanding rustic architectural design as the eight bridges in Yosemite Valley listed on the National Register of Historic Places as a group in 1977" (NPS 1995). The California State Historic Preservation Office concurred with the findings of the park that the bridge is not eligible for

inclusion in the National Register of Historic Places, further stating that "the structure has no strong associations with historic events or persons, nor is it architecturally significant" (COHP 1995).

In a final consultation letter for the South Fork Bridge, the California State Historic Preservation Office acknowledged that the bridge was determined, "through formal consultation on July 24, 1995, between the National Park Service and the California State Historic Preservation Office, to be ineligible for the National Register of Historic Places" (COHP 1996). This letter was written in response to the receipt of a 1996 environmental assessment for the proposed bridge removal and replacement from the Federal Highway Administration.

In 1991, the bridge was documented to HAER standards, which included historical and descriptive data, measured drawings, and archival photographs (HAER No. CA- 113). This effort was part of the Yosemite National Park Roads and Bridges Recording Project.

Following removal of the timber trim, the sides of the bridge were encased in plain reinforced concrete and the wooden guardrail was replaced with an aluminum one. Although bridge reports provide no reason for the rail's replacement, it was likely necessary to meet current American Association of State Highway Transportation Officials standards (HAER No. CA- 113). The HAER documentation reiterates that the removal of the distinctive, decorative timber trim is an important change that contributes to the bridge's lack of architectural integrity, as it now has "little left to distinguish it from other highway bridges" (HAER No. CA- 113). In accordance with the protocols agreed upon by Yosemite National Park and the California State Historic Preservation Office on March 20, 1997, the current level of documentation for the South Fork Bridge was determined sufficient.

Social Resources

Socioeconomics

Approximately 3.5 million people visited Yosemite National Park in 2002 (NPS 2003c). Yosemite visitors spend millions of dollars on lodging, meals, transportation, and other goods and services, both inside the park and in gateway communities outside the park. As a result, park visitor spending is an important source of income and employment for the park, the primary park concessioner, and the gateway communities.

The South Fork Bridge is located near Wawona in Mariposa County, along Wawona Road near the park's south entrance, a primary entrance to the park for concession suppliers, visitors, local residents and businesses, and staff (NPS 1996a). The population of Mariposa County was approximately 17,130 in year 2000 (U.S. Census Bureau 2002) and is projected to reach 28,625 by 2040 (NPS 2000b). Recreation and tourism (including arts, entertainment, recreation, accommodations, food services, and other services) are the major industries in Mariposa County, providing 31.2% of employment. Major recreation areas in the county, aside from Yosemite National Park, include Stanislaus National Forest and Sierra National Forest, and the U.S. Forest Service/Bureau of Land Management managed recreation areas along the Merced River. Other recreation resources in Mariposa County include Lake McSwain and Lake McClure, which provide camping opportunities (NPS 2000b). Construction- related activities (including residential and commercial builders; general contractors; highway and street construction; other heavy construction; special trade contractors; plumbing, heating, and air conditioning contractors; painting and wall covering contractors; masonry, drywall, insulation, tile, and stone contractors; carpentry contractors; and concrete contractors) provide 9.1% of employment in the county (U.S. Census Bureau 2000, 2002).

There are approximately 50 National Park Service housing units, 62 concessions housing units, and 302 private housing units located in Wawona. Concessions facilities in Wawona include the 104- room Wawona Hotel complex, which features a dining room, bar, golf course, pro shop, and snack bar. Other concessions facilities include a grocery store, gift shop, service station, and stable. During the peak season, approximately 200 National Park Service and concession staff reside in Wawona (NPS 2003a). Commuting time between Wawona and Yosemite Valley is approximately 50 minutes. Heavy visitor traffic on the south entrance road during the summer and snow during the winter can increase commute times. The commute from Wawona to Fish Camp is about 15 minutes, to Sugar Pine is 20 minutes, and to Oakhurst is 30 minutes, under good conditions (NPS 2003a).

Transportation

State highways leading into Yosemite National Park (Highways 41, 120, and 140) transition at the entrance stations into an internal, parkwide system of roughly 200 miles of road (figure I- 1). The state of California has no rights- of- way through the park and, therefore, there are no state highways within the park; however, state highway numbers are used on park signs to help orient visitors (NPS 2000b). Additional transportation facilities within the park consist of a series of spur roads, access drives, pedestrian trails, bike paths, and parking areas accessed from the main roads.

On an average summer (August) day in 1998, approximately 7,365 vehicles entered the park and primarily consisted of park visitors and employees. Vehicle entries are generally evenly spread among the entrance stations. During peak- season months, the South Entrance Station (Wawona Road/ Highway 41) accommodated the highest percentage of entries (29%), while the Tioga Pass Entrance (Tioga Road/Highway 120 East) received 25% of entries, the Big Oak Flat Entrance (Big Oak Flat Road/Highway 120 West) received 24%, and the Arch Rock Entrance (El Portal Road/Highway 140) provided access for 22% (NPS 2000b).

The temporary Bailey bridge has replaced the condemned South Fork Bridge in the project area and carries traffic on Highway 41 over the South Fork Merced River. Wawona Road is approximately 27- miles long and is the principal access to the towns of Wawona and Mariposa Grove, Badger Pass Ski Area, Glacier Point, and Yosemite Valley. It is maintained for year- round access. Throughout its length, the 24- foot- wide road was constructed over mountainous terrain with steep grades and it is surrounded by moderate to dense forest. Average daily traffic volumes entering the South Entrance Station in August 1998, were approximately 2,120 vehicles. The temporary Bailey bridge is vulnerable to flooding and washouts and may not always be accessible (NPS 2000b).

Traffic Conditions

The number of vehicles using park roads has increased over the years, but traffic volumes generally do not exceed road capacity. This is consistent along the South Fork Merced River where Wawona Road crosses and then follows the river. Travelers encounter minor to moderate congestion on the busiest summer days (NPS 2000b).

Transit and Tour Bus Services

From spring through fall, a free shuttle bus service operates between Wawona and Mariposa Grove. During the summer, VIA Adventures, operating out of Merced, California, provides regional service through Wawona, operating buses from Merced to the park. A variety of park tours by Yosemite Transportation System is available for visitors choosing to explore the park by

means other than private vehicles. In summer, daily trips from Yosemite Valley include a hiker's bus to Glacier Point and one to Tuolumne Meadows, as well as a tour bus to Wawona that stops at the Mariposa Grove of Giant Sequoias (NPS 2000b).

Parking Facilities

Parking in the project area is provided in Wawona for visitors and employees associated with facilities such as the Wawona Hotel, the Wawona Store and gift shop, the Pioneer Yosemite History Center, a campground, and two picnic areas. Also, visitors riding the free shuttle bus to the Mariposa Grove of Giant Sequoias are encouraged to park in Wawona. Parking demand varies during the day, and from day to day, as the number of visitors and employees fluctuates (NPS 2000b).

Visitor Experience

Yosemite National Park is guided by the National Park Service enabling legislation, which has two purposes: (1) to preserve the unique natural resources and scenic beauty at the park; and (2) to make these resources available to visitors for study, enjoyment, and recreation. The experience of visitors in Yosemite National Park is dependent on a number of factors, including the availability of recreational and interpretive opportunities, the availability of services, and the quality of the recreational environment and facilities. In general, there are two sometimes overlapping groups of visitors: those who visit the developed or frontcountry areas of the park (including Yosemite Valley and Wawona) and El Portal, and those that visit the designated wilderness at the park (NPS 2000b). Visitation has grown substantially in recent years to nearly 3.5 million visitors annually in 2002 (NPS 2003c), a steady increase from two million visitors annually two decades ago. Each visitor is expecting an individual experience while entering an increasingly crowded environment.

Approaching Yosemite Valley along Wawona Road by way of the South Entrance, visitors are afforded views from above the Merced River gorge and have the opportunity to stop at Tunnel View to experience this world- famous and historical viewpoint into Yosemite Valley. From Tunnel View, trees in the Valley hide roads, and little evidence of human influence is evident. Tunnel View also offers a spectacular panorama, including Bridalveil Fall and El Capitan in the foreground, and the granite domes and cliffs of the east valley in the background (NPS 2000b).

In Wawona, observations show that visitors tend not to circulate through the area as much as in Yosemite Valley, though no formal data have been collected. Overnight visitors to Wawona stay in the Wawona Hotel, in private lodgings, or at Wawona Campground. Most visitors access the Wawona area in private vehicles. A free shuttle bus operates seasonally, carrying visitors from the Wawona Store to the Mariposa Grove of Giant Sequoias (NPS 2000b).

Recreation

Camping along the South Fork Merced River is available at Wawona Campground year round. Other recreational activities available in Wawona and along the South Fork Merced River near the project site include hiking, picnicking, cross- country skiing, fishing, photography, swimming/ wading, nature study, livestock use, sightseeing, rafting, interpretation programs, and golfing. Day hiking opportunities are available in Wawona and near the project site. Some trails parallel or lead to destinations along the river; a trail loops around Wawona Meadow; and several trails lead to the wilderness, the Mariposa Grove of Giant Sequoias, and other popular day- hiking destinations (NPS 2000b). In Wawona, the picnic tables near the Pioneer Yosemite History Center and Wawona Campground are heavily used by park visitors.

Most cross- country ski routes in the Wawona area follow summer trails or traverse open meadows. At the 4,000- foot elevation, Wawona sometimes has little or no snow for long periods, and snow at lower elevations is rare. Some cross- country skiing may take place on Wawona Meadow and the golf course. The temporary Bailey bridge and Wawona Road provide visitors entering from the south access to the Badger Pass downhill and cross- country ski area. On the South Fork Merced River, most fishing takes place downstream of the water intake and impoundment area of the water treatment facility, primarily for introduced brown and rainbow trout. Along the South Fork Merced River, swimming is common in the vicinity of Swinging Bridge, near Wawona Campground, and the picnic area east of the campground (NPS 2000b).

Both commercial and private livestock uses are currently found in Wawona. Livestock boarding is available in Wawona at the concessioner's stable, and a horse camp is available. Except where posted, all designated trails are open to livestock and are maintained to accommodate livestock traffic. The primary concessioner offers various livestock trips from Wawona, including a two-hour ride, a half- day trip, and a full- day trip. These rides offer an opportunity for visitors with mobility impairments to experience the wilderness (NPS 2000b). Limited rafting occurs on the South Fork Merced River between Swinging Bridge and Wawona Campground. In this reach, the river is relatively flat. Rafting regulations have been implemented to protect river habitat and provide for visitor safety. The presence of large woody debris in the channel may pose a potential risk to rafters, and park and concession staff attempt to warn visitors engaged in rafting activities of this hazard (NPS 2000b).

Golf is available in Wawona at the historic Wawona Golf Course (established in 1918). The length of time the course is open varies year by year, depending on weather conditions, but it is open June through October most years. Golf course use ranges from 1,100 to 3,400 visitors per month (NPS 2000b).

Scenic Resources

The South Fork Bridge is located near the southern park boundary in an area known for its cultural amenities and recreational resources, in addition to providing pleasant views of the surrounding landscape. In terms of landscape features, the South Fork Merced River, the river corridor (particularly downstream views), Wawona Dome, and intervening forested hills and slopes provide a pleasant scenic vista for visitors. From the South Fork Bridge, visitors have access to the landscape views described above and may also observe the Wawona Golf Course, Wawona Store, the historic Covered Bridge, and the Pioneer Yosemite History Center exhibits. Within a short walk south of the bridge, the historic Wawona Hotel is visible from Wawona Road.

In general, the scenery of Yosemite National Park is one of its most significant resources and is largely responsible for its enormous popularity. A visual analysis has been completed for Yosemite Valley, and was based on scenic viewing potential. Based on the analysis, locations within the valley were classified as A- Scenic (viewpoints most commonly selected by eminent photographers or painters), B- Scenic (points less commonly selected), or C- Scenic (areas of minor scenic quality). If this classification were applied to areas outside of Yosemite Valley, the river reach containing the South Fork Bridge would likely be classified as C- scenic, because it can accept visual intrusion without detracting from either primary or secondary vistas, due to the development that already exists at this site.

The South Fork Merced River contributes substantially to the area scenic value. The banks are lined with riparian trees and shrubs; boulders, rocks, and cobble; and logs and other woody debris, which adds to its rugged character. During the spring, the river changes from that of small riffles and runs within the cobble bed to a bank- full watercourse supporting eddys, runs, and minor waves with white- caps.

The Wawona area provides pleasant views of Wawona Dome, the South Fork Merced River, and the surrounding hills and slopes. There is a scenic interface of river, rock, and forest throughout this narrow valley. To the east of the bridge, views include the developed historic landscape of Wawona.

The existing South Fork Bridge structure, with its rock and masonry piers and wingwalls, fits comfortably within the Wawona landscape (even though altered significantly for rehabilitation during the 1960s). The temporary Bailey bridge that has been in place since 1998 represents a visual intrusion for the Wawona area because of its overall height, rectangular shape, and the shiny silver finish of the galvanized steel lattice. The proposed South Fork Bridge would incorporate a natural river cobble façade around all railings and along the interior walls and a formliner façade emulating natural material and style on the abutments and exterior approach walls.

Downriver view from South Fork Bridge

NPS Photo

Wawona Store looking from the South Fork Bridge

NPS Photo

Park Operations and Facilities

Park facilities and infrastructure in the vicinity of South Fork Bridge include the categories of roads and bridges, visitor facilities, and utilities. The road segment encompassing this proposed project (approximately 0.22 mile) lies predominantly between Chilnualna Falls Road to the north and Forest Drive to the south. Approximately 200- feet upriver, the historic Covered Bridge (listed on the National Register of Historic Places) provides pedestrian access to the Pioneer

Yosemite History Center. One service road, with a small bridge constructed over Angel Creek, is present in the southwestern project quadrant and provides access to the pump station used to pressurize irrigation lines for reclaimed water distribution on the Wawona Golf Course. The southeastern project quadrant supports Forest Road and another access road for the filling station, Wawona Store, and the shuttle bus parking area.

Several visitor facilities are present near the South Fork Bridge site, they include: (1) the Wawona Golf Course and the earthen parking area in the vicinity of the southwestern project quadrant; (2) the Wawona Hotel, gas station, store, gift shop, and parking area for shuttle buses in the vicinity of the southeastern project quadrant; (3) Wawona Campground and picnic area in the vicinity of the northwestern project quadrant; and (4) the Covered Bridge, Pioneer Yosemite History Center, ranger office, Wawona District Materials Storage Area, and the wastewater treatment plant in the vicinity of the northeastern project quadrant. Approximately one- third of the visitors to the park drive to Wawona and cross the South Fork Merced River at the bridge site.

Utility lines are attached to the South Fork Bridge and provide water, sewage, electricity, and communications functions. A 10- inch reclaimed waterline with a defuser has been attached to the downriver side of the bridge. This line carries reclaimed tertiary- treated gray water from the water treatment plant to the pump station for Wawona Golf Course. An 8- inch gravity sewerline has been attached to the upriver side of the bridge. This line carries sewage from the Wawona Hotel, primarily, to the wastewater treatment plant. Attached underneath the bridge structure are a 4- inch high voltage electrical line conduit, telecommunications lines, and alarm systems. The telecommunications lines provide telephone service and Internet access to the Wawona Hotel, and the electrical line services the pump station. All of these utilities will require transfer to the temporary bridge prior to removal and replacement of the South Fork Bridge. Because of its height, a lift station will be required to maintain the flow of sewage in the gravity sewerline.

Park operations and facility staff representing both the Facilities Management and Resources Management divisions would oversee the contract work necessary to complete the South Fork Merced River Bridge Replacement Project. Facilities Management staff conduct preventative and corrective maintenance on park infrastructure, including water, wastewater, and electric utility systems, park roads, trails, and structures. Resources Management staff protect the natural, historic, and cultural resources of the park. They are responsible for resource monitoring and evaluation, impact mitigation, restoration, and wildlife management (NPS 2000b).